5-2410-233-20/973

TM 5-2410-233-20

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

TECHNICAL MANUAL

ORGANIZATIONAL MAINTENANCE MANUAL

TRACTOR, FULL-TRACKED, LOW SPEED; DED; MEDIUM DRAWBAR PULL; OSCILLATING TRACK, 78-IN. GAGE (CATERPILLAR MODEL D7F)

WITH RIPPER; FSN 2410-177-7283

WITH WINCH; FSN 2410-177-7284

This copy is a reprint which includes current pages from Changes 1 and 2.

HEADQUARTERS, DEPARTMENT OF THE ARMY

AUGUST 1973

D 101.11:

READEX FICHE best copy available

WARNING

HYDRAULIC OIL UNDER PRESSURE

2000 PSI is used in the operation of this equipment.

Death or severe injury may result if personnel fail to observe safety precaution.

Passengers are not permitted to ride other than in the seat as there is danger of being thrown into the tracks when tractor is in motion.

During removal and installation of crankcase and transmission guard make sure that no personnel are under the tractor as these guards are heavy and can cause bodily injury.

CHANGE
No. 2

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, DC, *14 December 1982*

Organizational Maintenance Manual
TRACTOR, FULL-TRACKED, LOW SPEED; DED;
MEDIUM DRAWBAR PULL; OSCILLATING TRACK,
78-IN. GAGE (CATERPILLAR MODEL D7F)
WITH RIPPER; NSN 2410-00-177-7283
WITH RIPPER AND ROPS; NSN 2410-00-185-9794
WITH RIPPER, ROPS (CAB) WINTERIZED; NSN 2410-00-300-6665
WITH WINCH; NSN 2410-00-177-7284
WITH WINCH AND ROPS; NSN 2410-00-185-9792
WITH WINCH, ROPS (CAB) WINTERIZED; NSN 2410-00-300-6664

TM 5-2410-233-20, 31 August 1973, is changed as follows:
Page 2-6. Figure 2-4 is superseded as follows:

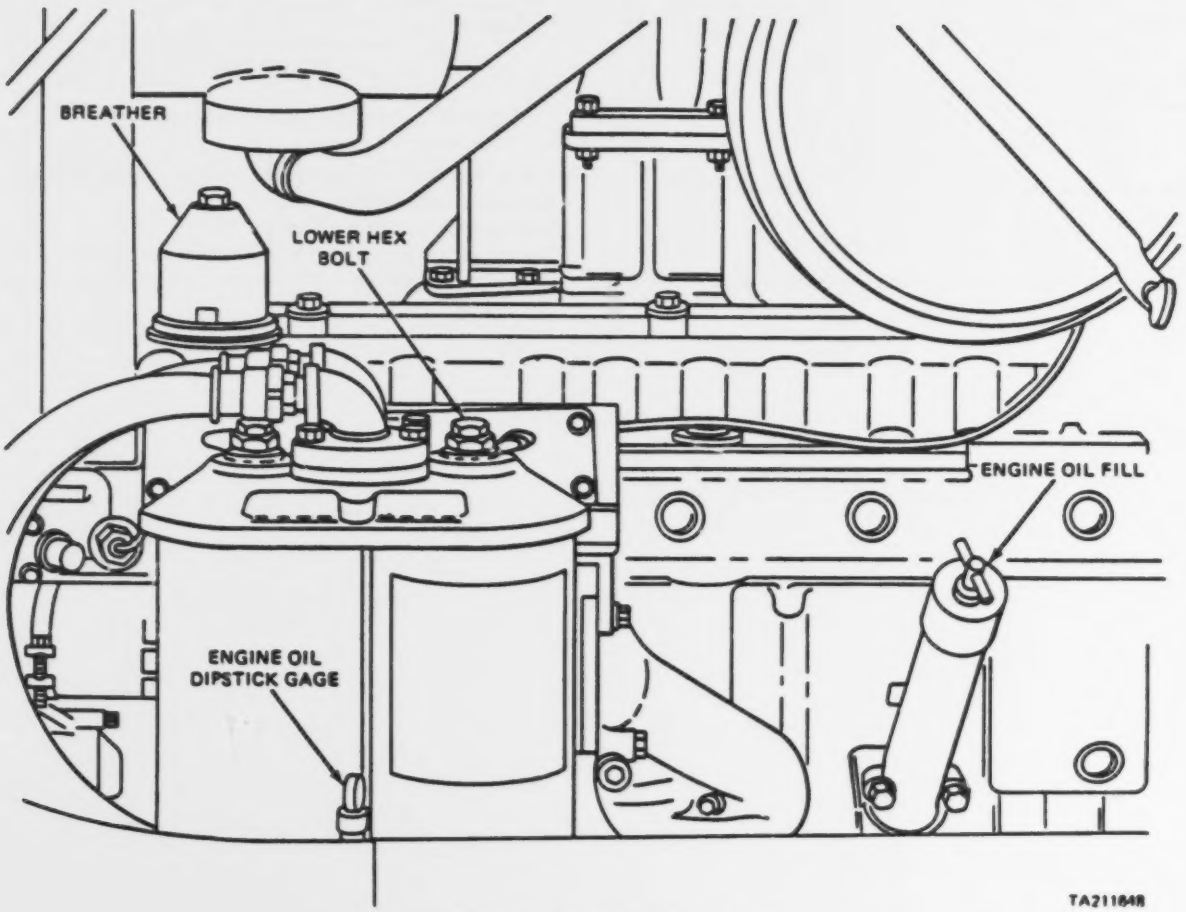

Figure 2-4. Engine oil system servicing.

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Page 2-49. Paragraph 2-44 is superseded as follows:

2-44. Track Shoe Replacement

Track shoes should be replaced when they are worn to a point where little or no traction is afforded or when they are broken. Replace shoes by removing attaching hardware and install replacement shoes.

Use caution when installing track shoe nuts.

The Track Shoe Nut has a different appearance on each side. One side has rounded edges and a larger flat surface than the other side which has a radius around the outer edges (See fig 2-31.1). The side having the rounded edges and flat surface must be installed in the notch of the track link to prevent the nut from turning when the bolt is tightened (See fig 2-31.2). The side having the radius does not fit properly in the notch, resulting in the nut not being tightened securely. Caution must be used to insure the nut is installed correctly.

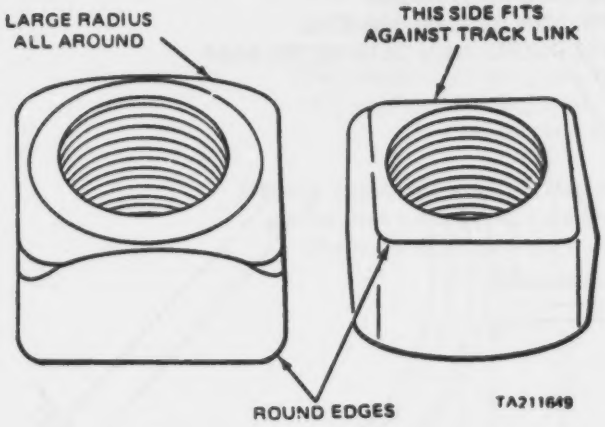


Figure 2-31.1. Opposite sides of track shoe nuts.

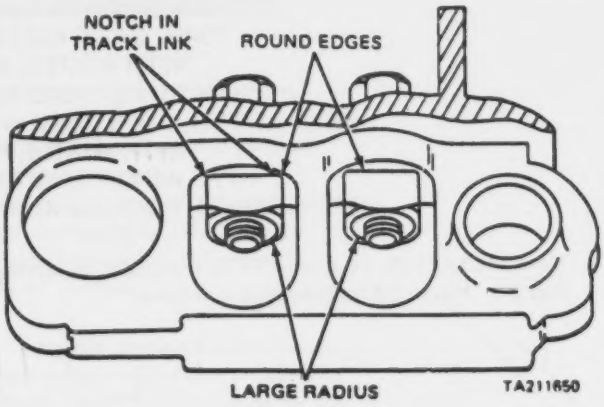


Figure 2-31.2. Track shoe nuts correctly installed.

Page B-9, Appendix B, Section III. The following is added:
Reference code column – "3-0".
Maintenance category column – "0".
Nomenclature column – "WRENCH, socket set".
Tool number column – "5120-00-240-5300".

By Order of the Secretary of the Army:

E.C. MEYER
General, United States Army
Chief of Staff

Official:

ROBERT M. JOYCE
Major General, United States Army
The Adjutant General

Distribution:
To be distributed in accordance with DA Form 12-25B Organizational maintenance requirements for Tractors, Tracked, Medium.

CHANGE
No. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, *8 May 1981*

Organizational Maintenance Manual
TRACTOR, FULL-TRACKED, LOW SPEED; DED; MEDIUM DRAWBAR PULL; OSCILLATING TRACK, 78-IN. GAGE (CATERPILLAR MODEL D7F)
WITH RIPPER; NSN 2410-00-177-7283
WITH RIPPER AND ROPS; NSN 2410-00-185-9794
WITH RIPPER, ROPS (CAB) WINTERIZED; NSN 2410-00-300-6665
WITH WINCH; NSN 2410-00-177-7284
WITH WINCH AND ROPS; NSN 2410-00-185-9792
WITH WINCH, ROPS (CAB) WINTERIZED; NSN 2410-00-300-6664

TM 5-2410-233-20, 31 August 1973, is changed as follows:

The title is changed as shown above.

Page i, following chapter 2, section XV add the following: "XVI. Maintenance of the roll-over protective structure" paragraph "2-64" page "2-80".

Page ii, List of Illustrations.

2-1 change "moldboard and push beams" to "moldboard and push arms".

Following 2-1 add the following:

2-1.1. Moldboard and push arms (w/ROPS), right side ..... 2-2.

Following 2-28 add the following:

2-28.1. Steering Clutch control linkage ..... 2-46.

Following 2-52 add the following:

2-52.1. Tractor body accessories (w/ROPS), right side ..... 2-75.

Following 2-54 add the following:

2-54.1. Tractor body accessories (w/ROPS), left side ..... 2-79.

Following 2-55 add the following:

2-56. Roll-over protective structure ..... 2-81.

Page 1-1. Paragraph 1-5 is superseded as follows:

1-5. Reporting Errors and Recommending Improvements

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter or DA 2028 (Recommended Changes to Publications and Blank Forms) direct to: Commander, US Army Tank-Automotive Command, ATTN: DRSTA-MBP, Warren, MI 48090. A reply will be furnished to you.

Paragraph 1-7*a*(1) is superseded as follows:

(1) *US Army identification plate.*

Manufactured by	Caterpillar Tractor Co.
Model	D7F
Serial number	61G and up
National stock number	2410-00-177-7283 (w/ripper) 2410-00-185-9794 (w/ripper and ROPS) 2410-00-300-6665 (w/ripper and ROPS (CAB) WINTERIZED) 2410-00-177-7284 (w/winch) 2410-00-185-9792 (w/winch and ROPS) 2410-00-300-6664 (w/winch and ROPS (CAB) WINTERIZED)
Engine serial number	61G and up
Length w/winch and dozer	232 in.
Length w/ripper and dozer	287 in.
Width	133 in.
Height w/ROPS and exhaust stack	131 in.
Height w/ROPS, w/o stack	124 in.
Height w/o ROPS and stack	93 in.
Shipping weight w/ROPS, winch and dozer	49,400 lb.
Shipping weight w/ROPS, ripper and dozer	54,870 lb.
Shipping weight w/o ROPS	46,460 lb.

Paragraph 1-7*b*(1) is superseded as follows:

(1) *Tractor.*

Forward speed:	
Gear 1	0-2.2 mph
Gear 2	0-3.9 mph
Gear 3	0-6.0 mph
Reverse speed:	
Gear 1	0-2.6 mph
Gear 2	0-4.6 mph
Gear 3	0-7.1 mph
Weight, ROPS	1,850 lbs.
Weight, tractor (w/ROPS)	39,490 lbs.
Weight, tractor only (w/o ROPS)	36,760 lbs.
Weight, dozer and push arms	6,617 lbs.
Weight, winch	3,080 lbs.
Weight, ripper	7,515 lbs.
Weight, operating (w/dozer, winch, fuel and lubricants)	49,400 lbs.
Weight, operating w/o ROPS (w/dozer, winch, fuel and lubricants)	47,700 lbs.

Weight, operating (w/ripper, and dozer, fuel and lubricants)	54,870 lbs.
Weight, operating, w/o ROPS (w/dozer, ripper, fuel and lubricants)	50,800 lbs.
Length, overall w/winch and dozer	232 in.
Length, (w/ripper and dozer)	287 in.
Width, overall	133 in.
Width, w/o moldboard and push arms	105 in.
Height, overall (w/ROPS and exhaust stack)	131 in.
Height, reducible (w/ROPS, w/o exhaust stack)	121 in.
Height, overall (w/o ROPS)	124 in.
Height, reducible (w/o ROPS and exhaust stack)	93 in.
Winch, rear mounted, reversible	1 drum
Ripper, rear mounted	3 shanks
Bridge weight classification	46

Page 2-1.

Paragraph 2-2*a*(3). Change "short cable" to "positive to negative cable assembly".

Paragraph 2-2*a*(5). Change "battery-to-disconnect" to "disconnect".

Paragraph 2-2*b*.

Paragraph title. Change "Beams" to "Arms".

Subparagraph (1). Change "push beams" to "push arms".

Subparagraph (2). Change "push beams" to "push arms".

Subparagraph (3). Change "beams" to "arms".

Subparagraph (4). Change "Install beams" to "Install arms" and "beam caps" to "arm caps".

Paragraph 2-2*c*(2) add "(fig. 2-48)."

Page 2-2. Figure 2-1 is superseded as follows:

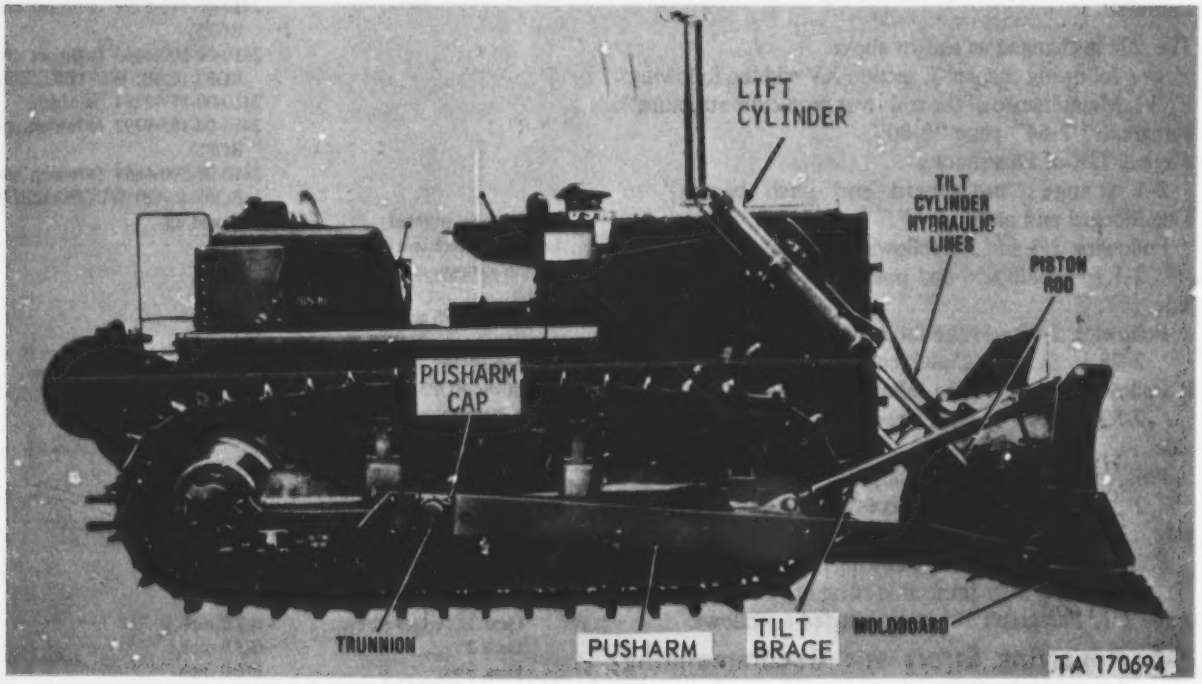


Figure 2-1. Moldboard and push arms.

Figure 2-1.1 is added as follows:

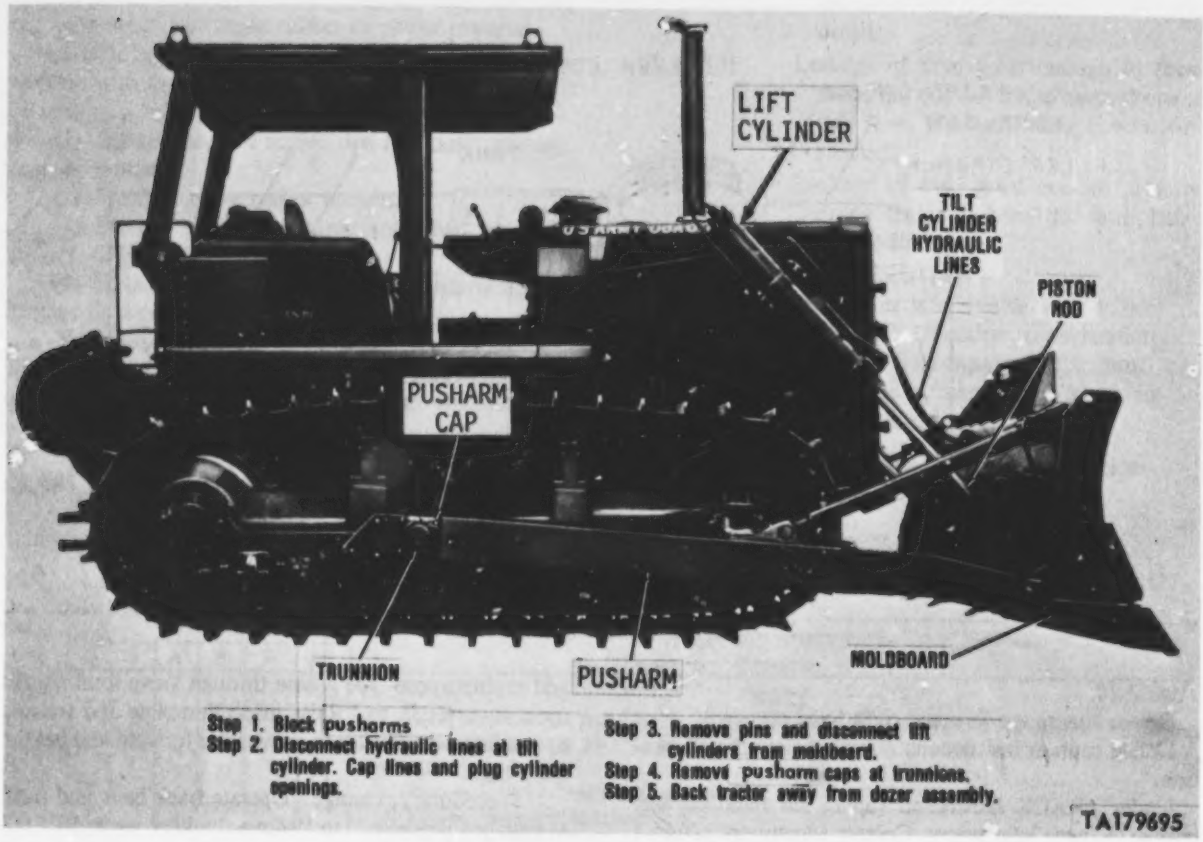

LIFT CYLINDER
TILT CYLINDER HYDRAULIC LINES
PISTON ROD
PUSHARM CAP
TRUNNION
PUSHARM
MOLDBOARD
Step 1. Block pusharms
Step 2. Disconnect hydraulic lines at tilt cylinder. Cap lines and plug cylinder openings.
Step 3. Remove pins and disconnect lift cylinders from moldboard.
Step 4. Remove pusharm caps at trunnions.
Step 5. Back tractor away from dozer assembly.
TA179695

Figure 2-1.1. Moldboard and push arms (w/ROPS).

Page 2-4. Paragraph 2-7 is superseded as follows:

2-7. Hydraulic Control System

a. 500 Hour Service. Every 500 hours of operation, or every 3 months, whichever comes first, service the hydraulic control system as follows:

(1) Lower all equipment and stop engine.

(2) Loosen bleed plug to relieve any pressure (fig. 2-3).

(3) Remove cover and old element.

(4) Check cover seal. Install new seal if necessary.

(5) Install new element. Install cover.

(6) Start engine and operate at low idle.

(7) Check oil level and add oil as required.

b. 2000 Hour Service. Every 2000 hours of operation or one year, whichever comes first, service the hydraulic control system as follows:

(1) Position the tractor so the hydraulic cylinder can move a complete stroke. Raise equipment to top of stroke.

(2) Stop engine. Remove fill cap, and open drain valve. Allow oil to completely drain.

(3) Lower all equipment.

(4) Close drain valve.

(5) Change filter as described in *a*(3), (4), and (5) above.

(6) Remove and wash the filler strainer in clean non flammable solvent and reinstall.

(7) Fill hydraulic tank to *FULL* mark on level gage.

(8) Open bleed plug and start engine.

(9) Close bleed plug when oil flows without air bubbles.

(10) Raise equipment and position tractor on level surface.

(11) Lower equipment and check oil level.

(12) Add oil as required.

Page 2-5. Figure 2-3 is superseded as follows:

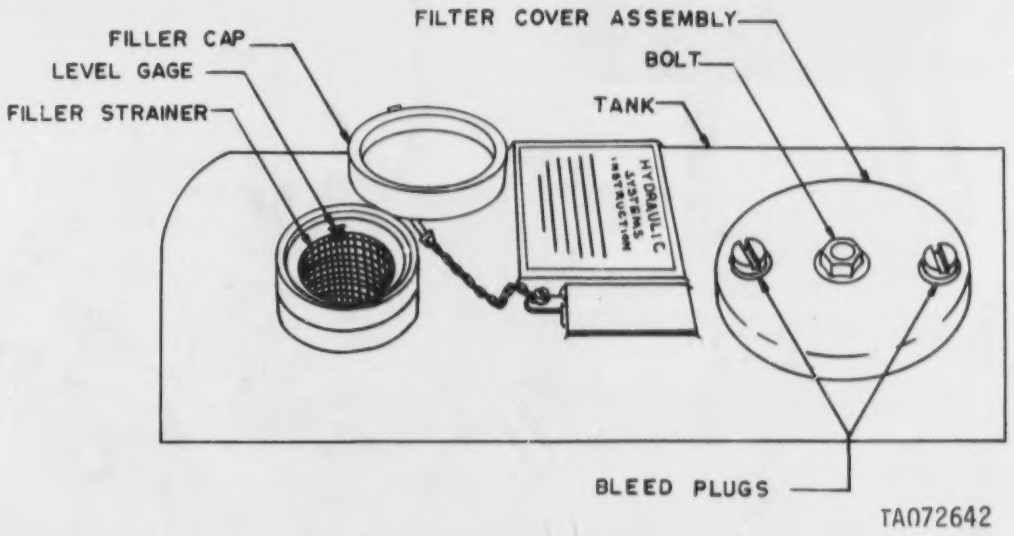


Figure 2-3. Hydraulic system servicing.

Page 2-10.

Delete illustration in upper right hand corner.

Delete caution instructions directly below the illustration.

Under TRACK illustration (upper left hand corner) change "Check adjustment. Correct adjustment allows 1 to 1½ inches (25 to 38 mm) sag at this point" to "Visually check track sag for indication of bad track adjustment."

Under "IF TRACK IS TOO LOOSE."

Procedures 1, change "Raise inspection plate and add multipurpose-type grease through valve until adjustment is correct". to "Raise inspection plate and activate hydraulic track adjuster to move idler forward and get the track tight."

Procedure 2, change "Operate track back and forth to equalize pressure." to "Move the idler back .50" (13 mm) from the tight position."

Procedure 3, delete "Recheck adjustment".

Under "IF TRACK IS TOO TIGHT," procedure 4 delete "Recheck adjustment".

Page 2-11. Section V. is superseded as follows:

Section V. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES

2-12.1 General

Preventive maintenance is detecting/correcting problems before they happen, or fixing little problems before they become big problems. Table 2-1 contains a list of preventive maintenance checks and services to be performed by organizational maintenance personnel. Attention to these checks and services will increase the useful life of the tractor but every possible problem cannot be covered in the PMCS. Be alert for anything that might cause a problem. If anything does look wrong, and you can't fix it, write it on a DA Form 2404 and report it to your supervisor. Be sure to record any corrective action.

2-12.2 Organizational Preventive Maintenance Checks and Services

a. Perform the checks and services at the intervals shown in table 2-1.

(1) Do the (Q) checks and services once each three months.

(2) Do the (S) checks and services twice a year, or each six months.

(3) Do the (A) checks and services once each year.

(4) Do the (B) checks and services once each two years.

(5) Do the (H) checks and services at the hour interval listed.

(6) Do the (MI) checks and services when the mileage of the vehicle reaches the amount listed.

b. If the tractor doesn't work properly and you can't see what is wrong, refer to table 2-2 for troubleshooting instructions.

WARNING

Drycleaning solvent (SD-2), used to clean parts, is potentially dangerous to personnel and property. Do not use near open flame or excessive heat. Flash point of solvent is 138° F.

c. Make cleanup a part of your preventive maintenance. Dirt, grease, oil, and debris may cover up a serious problem. Wipe off excess grease and spilled oil. Use dry-

cleaning solvent (SD-2) to clean metal surfaces. Use soap and water when you clean rubber or plastic material.

d. Watch for and correct anything that might cause a problem with the tractor. Some things you should watch for are:

(1) Bolts, nuts, and screws that are loose, missing, bent, or broken.

(2) Welds that are bad or broken.

(3) Electric wires and connectors that are bare, broken, or loose.

(4) Hoses and fluid lines that leak, or show signs of damage or wear.

e. You should know how fluid leaks affect the status of your equipment. Learn and be familiar with the following definitions of the types/classes of leakage. Remember—when in doubt, notify your supervisor!

Leakage definitions for PMCS are:

CLASS I Seepage of fluid (indicated by wetness or discoloration) not great enough to form drops.

CLASS II Leakage of fluid great enough to form drops but not enough to cause drops to drip from the item being checked/inspected.

CLASS III Leakage of fluid great enough to form drops that fall from the item being checked/inspected.

CAUTION

Equipment operation is allowable with minor leakage (Class I or II). Of course, consideration must be given to the fluid capacity in the item/system being checked/inspected. When in doubt, notify your supervisor.

Class III leaks should be corrected before releasing equipment for operation.

Table 2-1. Organizational Preventive Maintenance Checks and Services

Q—Quarterly S—Semiannually A—Annually B—Biennially H—Hours MI—Miles

Item No.	Interval Q	S	A	B	H	MI	ITEM TO BE INSPECTED Procedure
							NOTE PERFORM OPERATOR/CREW PMCS PRIOR TO OR IN CONJUNCTION WITH ORGANIZATIONAL PMCS.
1							BATTERIES
	•						*a.* Remove corrosion from clamps and posts.
	•						*b.* Tighten loose cables and mountings.
	•						*c.* Check for obvious defects, such as cracked case, broken or loose battery terminals.
	•						*d.* Check specific gravity of electrolyte in each cell. (See TM 9-6140-200-14).
2		•					FAN BELTS Check adjustment. Correct adjustment is 7/8-inch deflection midway between pulleys. Installation with new belts is 3/4-inch deflection.
3		•					RADIATOR Check for antifreeze protection if winter temperatures fall below +32° F. (See TB 750-651).
4		•					HYDRAULIC CONTROL SYSTEM *a.* Replace filter element.
	•						*b.* Inspect hoses and lines for deterioration and damage.
5			•				ENGINE VALVE ADJUSTMENT Check valve adjustment (inlet 0.015, exhaust 0.025). Observe if oil is being delivered to valve mechanism.
6							UNDER CARRIAGE
	•						*a.* Check track tension. Correct adjustment allows 1-inch sag at point midway between front support roller and idler.
		•					*b.* Inspect track, links, pins, and bushings for wear.
		•					*c.* Check idlers for loose mounting, leaking seals, and wear.
		•					*d.* Remove guards and check equalizer bar support pads for cracks or separation.
		•					*e.* Check track shoes for bends, cracks, and breaks. Check bolt hole distortion and grouser wear.
7		•					SPROCKET HUB BEARINGS Check bearings for noticeable movement. Adjust as required.
8		•					TRACK CARRIER AND SUPPORT ROLLERS Inspect the track carrier rollers for cracks or obvious damage or wear. When the contact surface wear or flange wear exceeds 1/4 inch have replaced.
9							DOZER
	•						*a.* Inspect cutting edges and end bits for wear.
	•						*b.* Check sockets and mounting pins for wear.
10	•						TRANSMISSION Check oil level in transmission. ADD as required to full mark on dipstick.
11	•						RIPPER Check for insecure mounting, damaged hoses, and leaks at cylinder.

Page 2-14, table 2-2.
Malfunction 2.
Step 1. Add "(para 2-9)".
Step 4. Delete entirely.
Step 5. Change "5" to "4".
Malfunction 6.
Step 1. Add "(para 2-8)".
Step 2. Delete entirely.
Page 2-16, table 2-2, malfunction 16, step 2. Add "(para 2-56.1)".
Page 2-22. Figure 2-13 is superseded as follows:

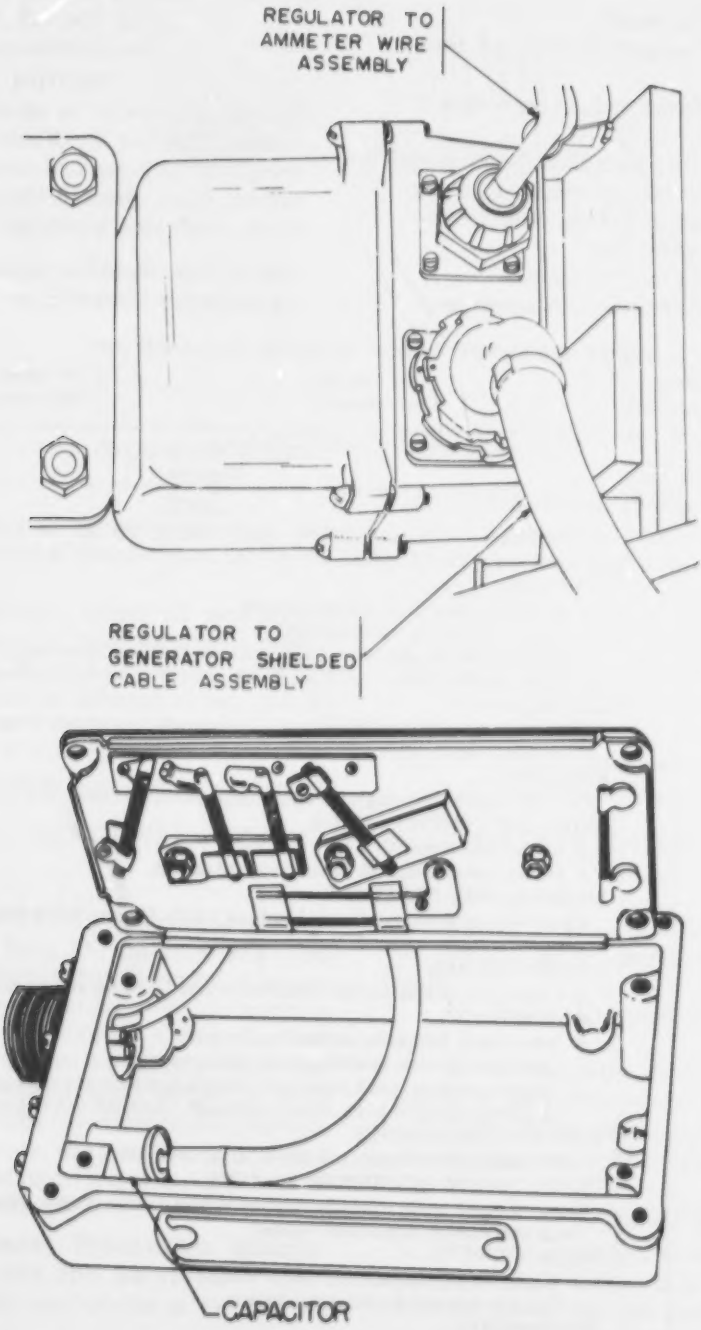


Figure 2-13. Radio interference suppression components.

Page 2-30, paragraph 2-22*d* is superseded as follows:

d. Suspend the thermostat and a thermometer in a pan of water. Apply heat to the pan, and stir the water to maintain a uniform temperature.

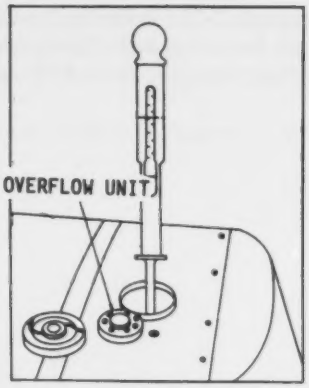
Page 2-31. Figure 2-17 is superseded as follows:

Use clean water that is low in scale forming minerals - not softened water.

Add Rust Inhibitor to coolant except when using permanent type antifreeze containing rust inhibitors.

Never add coolant to an overheated engine. Allow it to cool first.

When draining and refilling the cooling system, always recheck the coolant level after the engine reaches normal operating temperature. Maintain coolant level 1/2 inch below bottom of fill pipe.



Check specific gravity of antifreeze solution frequently in cold weather to assure adequate protection.

CLEANING COOLING SYSTEM

1. Run engine long enough to warm coolant. Loosen filler cap to relieve pressure.

2. Remove filler cap. Open valve and allow coolant to drain.

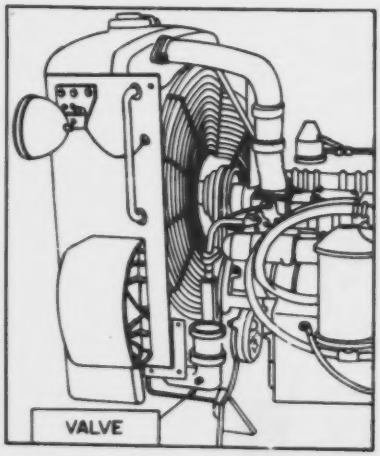
NOTE

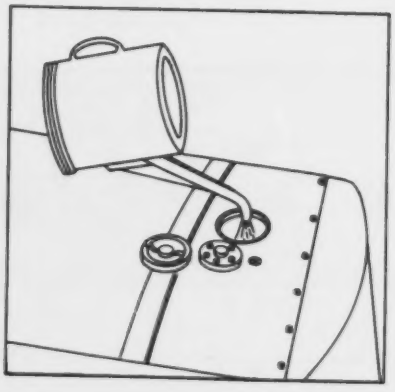
Most commercial cooling system cleaners may be used.

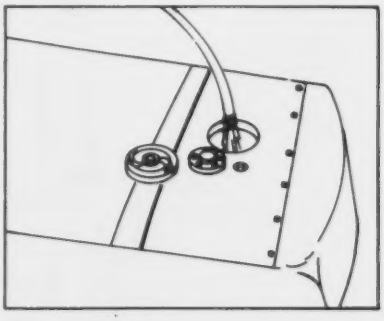
3. Close drain valve and fill system with cleaning solution. (1)

4. Start engine and operate for 1/2 hour.

5. Stop engine and open valve. Flush system with clean water until draining water is clear.







6. Close drain valve and fill system with neutralizing solution. (2)

7. Start engine and operate for 10 minutes.

8. Stop engine, open drain valve, and flush system.

9. Close drain valve and add coolant to proper level.

(a) Mix 2 lbs Sodium Bisulphate ($NaHSO_4$) per 10 gals (38 liters) water (25 grams per liter of water)

(b) Mix ½ lb Sodium Carbonate Crystals (Na_2Co_3, 10 H_2O) per 10 gals (38 liters) grams per liter of water).

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Figure 2-17. Cooling system servicing.

Page 2-41. Following paragraph 2-31 add the following:

2-31.1 Generator Regulator

a. Check for loose connections or damaged wires.

b. Check battery for state of charge.

(1) If battery is overcharged, decrease the spring tension in the regulator.

(2) If battery is undercharged, increase the spring tension in the regulator.

Page 2-44. Figure 2-26 is superseded as follows:

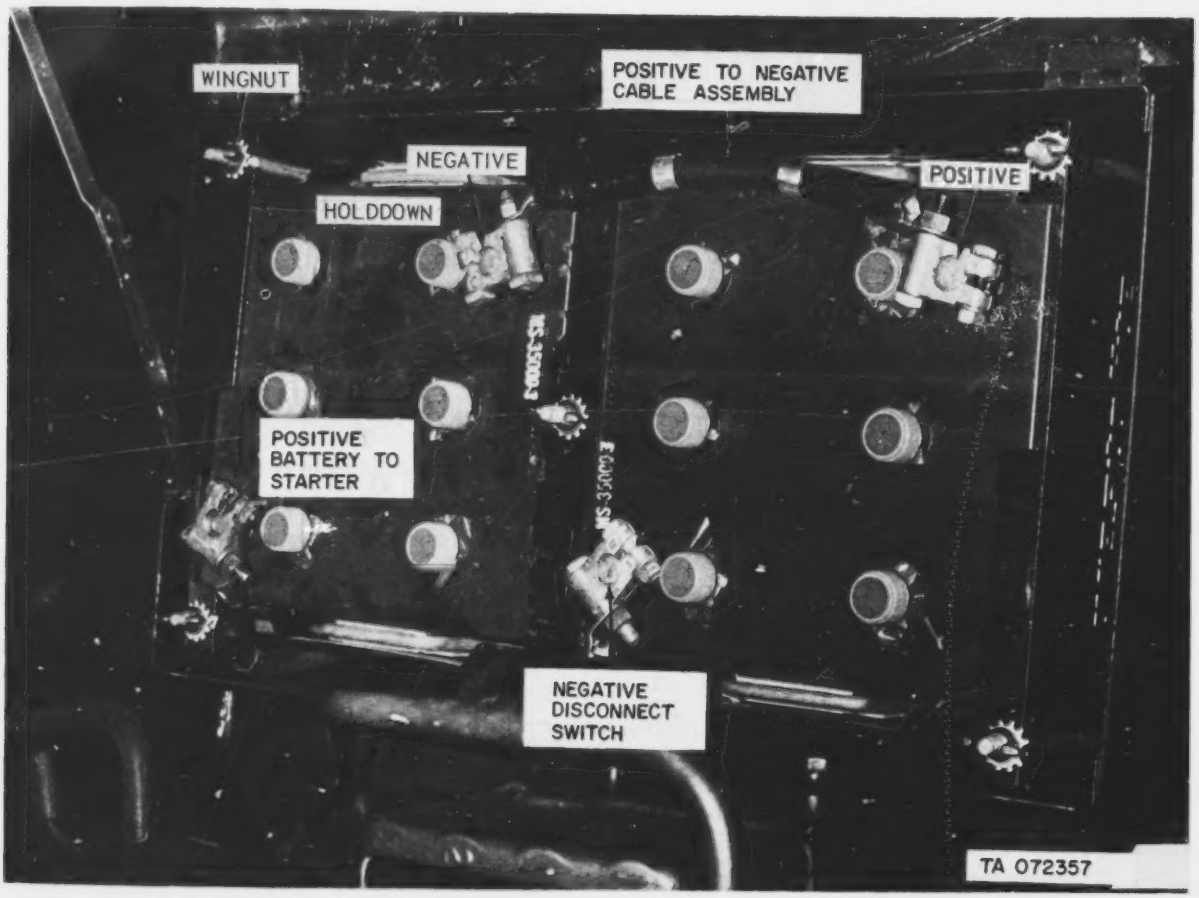


Figure 2-26. Battery box and batteries.

Page 2-45. Paragraph 2-37*a* is superseded as follows:

a. Testing.

(1) Use a DC voltmeter.

(2) Turn the disconnect switch to ON.

(3) Attach one lead of the voltmeter to the solenoid-battery cable connection on the starting motor (fig. 1-1). Ground the other lead. A zero indication on the voltmeter means the disconnect switch is defective.

Follcwing paragraph 2-40 add the following:

2-40.1 Steering Clutch Control Linkage Adjustment

a. Remove the pins connecting rod ends (7) to the bellcranks (fig. 2-28.1).

b. With the steering clutch control levers forward in the CLUTCH ENGAGED position and levers (4) against bumpers (5), adjust rod ends (7) so pin holes in rod ends are aligned with holes in bellcrank. Turn rod ends one half turn to shorten overall length of control rods (6). Lock the rod ends with the lock nuts. Install the pins and cotter pins.

c. With the steering clutch control levers forward in the CLUTCH ENGAGED position, adjust levers (1) so the distance from centerline of handles to face of dash assembly is equal to dimension (A). Lock the levers with the locknuts.

d. Loosen the nuts locking stop bolts (2) to the levers. Turn bolts into lever to provide clearance between bolt head and stop plate.

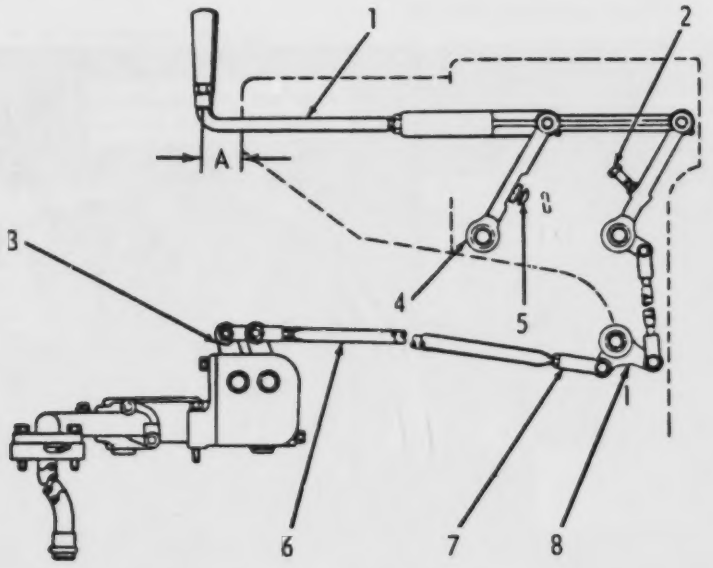
e. Pull the right steering clutch control lever back slowly until a definite resistance is felt. The plunger in the steering control valve will then be bottomed against the

shoulder in the valve spool housing.

f. With the right steering clutch lever held in this position, turn the right bolt (2) out until the head of bolt just contacts the plate. Turn the bolt out an additional one-half turn (to lengthen) and lock it with the nut.

g. Adjust the left stop bolt in the same manner.

Page 2-46. Figure 2-28.1 is added as follows:



1. STEERING CLUTCH CONTROL LEVERS
2. STOP BOLTS
3. HYDRAULIC CONTROL LEVERS
4. LEVERS
5. BUMPERS
6. CONTROL RODS
7. ROD ENDS
8. BELL CRANKS

A. 2.50±.12 IN. (63.5±3.0mm) DISTANCE BETWEEN FACE OF DASH AND CENTER LINE OF HANDLES ON LEVERS (1).

TA 170693

Figure 2-28.1. Steering clutch control linkage.

Page 2-48, paragraph 2-42*b.* Change "track from" to "track frame".

Page 2-52. Paragraph 2-47.

2-47. Dozer and Winch Hydraulic Pumps

(Fig. 2-34)

Deleted

Page 2-53. Delete figure 2-34.

Page 2-62, figure 2-42, procedure steps 1 and 6. Change "----pushbeams--" to "----push arms---".

Page 2-65. Following paragraph 2-56 add the following:

2-56.1 Seal Ring Bevel Gear Shaft

CAUTION

Use care when expanding seal rings. Seal ring material is fragile and breaks easily.

a. Removal. Remove right hand and left hand bearing retainers.

b. Inspection. Check for broken, scored, pitted and corroded cast iron seal rings.

c. Installation.

(1) Replace seal rings if worn or damaged.

(2) Re-install retainers (with shims) and tighten cap screws to 75 ft-lb.

Page 2-68.

Paragraph 2-57. Change " . . . .protectors, *or* tips. . .", to " . . . .protectors, *and* tips. . . .".

Figure 2-48, illustration 3. Change "Remove tip, protector *or* guard." to "Remove tip, protector *and* guard."

Page 2-74, paragraph 2-60*a.* Change "(fig. 2-52)" to "(fig. 2-52.1 w/ROPS)".

Page 2-75, add figure 2-52.1 as follows:

Figure 2-52.1. Tractor body accessories (w/ROPS), right side.

Figure 2-54.1. Tractor body accessories (w/ROPS), left side.

Page 2-78, paragraph 2-62 is superseded as follows:

2-62. Fenders, Battery Box, and Tool Box

a. Cleaning. Clean all parts using any applicable process which will accomplish cleaning without damage to the item(s).

b. Inspection. Inspect fenders, battery box, and tool box for dents, breaks, cracks, rust, and distortion.

c. Removal. Replace items uneconomical to repair or fabricate.

(1) Remove batteries from the battery box (left side, fig. 2-54, refer also to para 2-34*c*). Remove the battery box.

(2) Remove the tool box, (right side, fig. 2-52, or fig. 2-52.1 w/ROPS).

(3) Remove the fender(s).

d. Installation. Reverse the removal procedure to install the fenders, tool box, battery box and batteries. Tighten all attaching hardware, and torque to specifications (See paragraph 1-7*b*(11) for torque specifications).

Page 2-79, add figure 2-54.1 as follows:

Page 2-80. Following figure 2-55 add the following:

2-64. Instruction and Data Plates

a. Inspection. Inspect for missing, worn, deteriorated, and/or damaged plates.

b. Removal. Remove defective plates.

c. Installation. Replace and securely fasten all defective plates.

Paragraph 2-65 is added as follows:

2-65. Roll-over Protective Structure

a. Removal.

(1) Disconnect rear light wires and remove rear lights and brackets.

(2) Remove nuts and bolts (fig. 2-56) which secure the ROPS to the bayonets.

CAUTION

Be careful not to damage fuel tank and hydraulic tank when removing or installing the ROPS.

(3) Attach a suitable hoist to lifting eyes and remove the ROPS. (Approximate weight 1,850 lbs.)

(4) Remove rubber pads from the bayonets.

b. Cleaning. Clean all metal parts with drycleaning solvent (SD-2).

c. Inspection.

(1) Inspect welds for cracks. Reweld as required.

(2) Inspect for rust and chipped paint. Clean and repaint as necessary.

(3) Inspect rubber pads and clean with soap and water.

d. Installation.

(1) Install rubber pads on the bayonets.

(2) Lower ROPS onto the bayonets.

(3) Install bolts thru the ROPS and bayonets. Install nuts.

(4) Torque nuts to 500 lb-ft.

(5) Install rear light brackets and rear lights, and connect wires.

Figure 2-56 is added as follows:

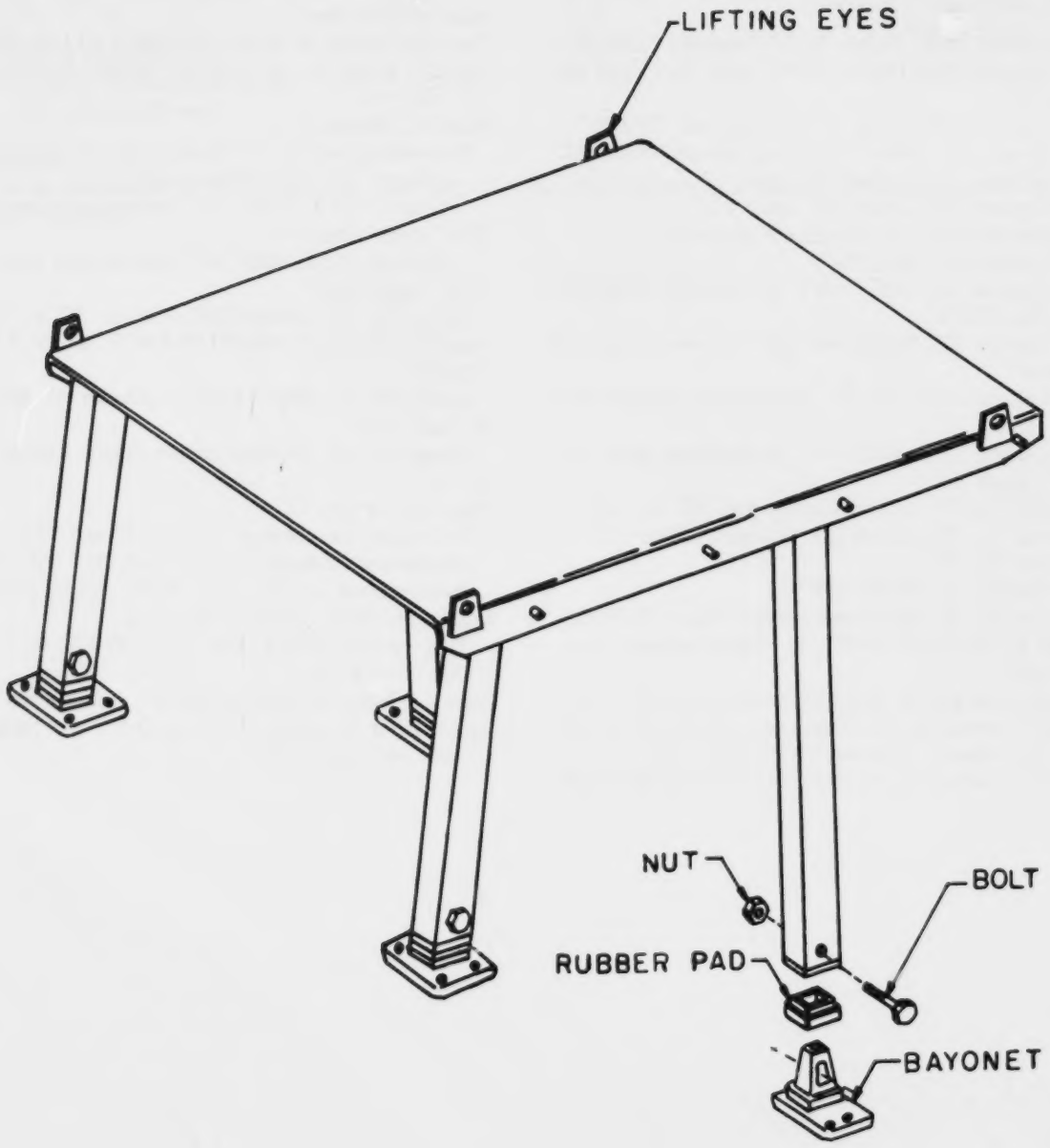


Figure 2-56. Roll-over protective structure.

Page A-1, paragraph A-3. Change "TB-740-93-1" to "TB 746-93-1".

Page B-2, Section II, group No. 02.

Column (2). Add "Trunnion Caps and Trunnion".

Column (3)H. Add "O" maintenance level and "3" repair time.

Column (3)I. Add "F" maintenance level and "2.5" repair time.

Page B-3, Group No. 06.

Column (2). Delete "Exhaust pipe" and "Trunnion

caps and trunnion" and add "Roll-over protective structure".

Column (3)A. Delete "C 0.1" and add "O 0.25".

Column (3)H. Delete "O 0.5" and "O 3." and add "F 0.75".

Column (3)I. Delete "F 2.5" and add "F 0.75".

Column (2). Delete "Trunnion caps and trunnion".

Column (3)H. Delete "0" and "3".

Column (3)I. Delete "F" and "2.5".

Following group No. 06 add the following:

Column (1). Add "07".

Column (2). Add "LIFT CYLINDER MOUNTING BRACKET".

Column (2). Indent and add "Trunnion caps and trunnion".

Column (3)H. Add "O" maintenance level and "3" repair time.

Column (3)I. Add "F" maintenance level and "2.5" repair time.

Group No. 07, column (1). Change "07" to "08".

Group No. 08, column (1). Change "08" to "09".

Group No. 09.

Column (1). Delete "09".

Column (2). Indent and change "SEALED PRESSURE OVERFLOW UNIT" to "Sealed pressure overflow unit".

Page B-4, Section II. MAINTENANCE ALLOCATION CHART, group No. 15 (Regulator), column (3)A. Add "O" maintenance level and "0.1" repair time.

Page B-5, Section II. MAINTENANCE ALLOCATION CHART, group No. 28. Change "Fuel Strainer" to "Element, primary filter".

Page B-6, Section II. MAINTENANCE ALLOCATION CHART, group No. 49 (Valves), column (3)D. Delete "0" and "0.2".

Page B-7, Section II.

Following group No. 50 (Cables) add the following:

Column (2). Add "Battery box".

Column (3)A. Add "O" maintenance level and "0.1" repair time.

Column (3)H. Add "O" maintenance level and "0.8" repair time.

Group No. 51, column (3)H. Change "F" to "O".

Page B-7, Section II. MAINTENANCE ALLOCATION CHART

Group No. 61, (Steering clutch) column (4). Add "4-H" and "5-H".

Group No. 62, (Fenders) column (3)H. Change "F" to "O".

Page B-9, Section III.

Reference code column. Add "4-H" and "5-H".

Maintenance category column. Add "H" and "H".

Nomenclature column. Add "BOLT, spring compressing" and "NUT, spring compressing".

Tool number column. Add "5360-00-426-4617" and "5310-00-919-2242".

Page I-1. Index, alphabetical listing L (Lift cylinder servicing). After paragraph 2-13 page 2-17, add paragraph "2-48" and page "2-54".

By Order of the Secretary of the Army:

E. C. MEYER
General, United States Army
Chief of Staff

Official:
J. C. PENNINGTON
Major General, United States Army
The Adjutant General

Distribution:
To be distributed in accordance with DA Form 12-25B, Organizational Maintenance requirements for Tractor, Tracked: Medium.

TECHNICAL MANUAL
No. 5-2410-233-20

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *31 August 1973*

ORGANIZATIONAL MAINTENANCE MANUAL

TRACTOR, FULL-TRACKED, LOW SPEED; DED; MEDIUM DRAWBAR FULL; OSCILLATING TRACK, 78-IN. GAGE (CATERPILLAR MODEL D7F) WITH RIPPER; FSN 2410-177-7283 WITH WINCH; FSN 2410-177-7284

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*This manual supersedes TM 5-2410-233-20, 4 June 1971, including all changes.

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CHAPTER 1

INTRODUCTION

Section I. GENERAL

1-1. Scope

This manual is published for the use of organizational maintenance personnel responsible for maintaining the Caterpillar D7F Full-Tracked Tractor.

1-2. Maintenance Forms and Records

Maintenance forms, records, and reports which are to be used by maintenance personnel at all maintenance levels are listed in and prescribed by TM 38-750.

1-3. Destruction of Materiel to Prevent Enemy Use

Instructions for destruction of materiel to prevent enemy use will be found in TM 750-244-3.

1-4. Administrative Storage

Instructions for preparation for shipment and limited storage will be found in TM 740-90-1.

1-5. Reporting of Errors

Report of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to Publications) and forwarded direct to Commander, U. S. Army Troop Support Command, ATTN: AMSTS-MPP, 4300 Goodfellow Boulevard, St. Louis, Missouri 63120.

Section II. DESCRIPTION AND DATA

1-6. Description

A general description of the tractor is contained in TM 5-2410-233-10. A more detailed description of specific components and assemblies is contained in the applicable maintenance paragraphs of this manual.

1-7. Tabulated Data

a. Identification.

(1) *U. S. Army identification plate.*

Manufactured by	Caterpillar Tractor Co.
Model	D7F
Serial number	61G and up
Federal stock number	2410-177-7283 (w / ripper) 2410-177-7284 (w / winch)
Engine serial number	61G and up
Length	232 in.
Width	133 in.
Height	93 in.
Shipping weight	46,460

(2) *Turbocharger warning plate.*

Altitude setting	7500 ft. or below

(3) *Tractor serial number plates.* One located on the firewall above battery slave connector, one located on left-rear of engine block, and one on the left-rear of the tractor.

(4) *Dozer serial number plate.* Located on right-rear of moldboard.

b. Tabulated Data.

(1) *Tractor.*

Forward speed:	
Gear 1	0-2.2 mph
Gear 2	0-3.9 mph
Gear 3	0-6.0 mph
Reverse speed:	
Gear 1	0-2.6 mph
Gear 2	0-4.6 mph
Gear 3	0-7.1 mph
Weight, tractor only	36,760 lbs
Weight, dozer and push arms	6,617 lbs.
Weight, winch	3,080 lbs.
Weight, ripper	7,337 lbs.
Weight, operating (w / dozer, winch, fuel, and lubricants)	47,700 lbs.
Length, overall	232 in.
Width, overall	133 in.
Width, w / o moldboard and push arms	105 in.
Height, overall	124 in.
Height, reducible	93 in.
Winch, rear mounted, reversible	1 drum
Ripper, rear mounted	3 shanks
Bridge weight classification	16

(2) *Engine.*

Manufacturer	Caterpillar Tractor Co.

(2) *Engine.* (Continued)

Type	Turbocharged, 4 stroke-cycle
Number of cylinders	6
Displacement	638 cu. in.
Rated horsepower (full load)	180 at 2000 rpm
Low idle speed	660 rpm
High idle speed	2210 rpm

(3) *Engine accessories.*

(a) Oil filter.

Make	Military Standard, MS35802
Type	Class 3
Element Part no.	Caterpillar, 3M198

(b) Air cleaner.

Make	Donaldson
Model	EGB12, dry-type
Element part no.	Caterpillar, 4M9334

(c) Fuel filter.

Make	Purolater
Model	MIL-F-20627, Type 2, Class II
Element part no.	Caterpillar, 3R2251

(4) *Transmission filter.*

Make	Caterpillar
Element part no.	J-6064
Federal stock number	2520-920-2041

(5) *Hydraulic tank filter.*

Make	Caterpillar
Element part no.	J-6064

(6) *Winch.*

Data plate	Located left side of winch
Lubrication plate	Located on top-right cover

(6) *Winch.* (Continued)

Make	Hyster
Model	D7K
Part no.	E77M1501P
Wire rope diameter	1 in.

(7) *Ripper.*

Data plate	Located on right beam
Make	Caterpillar
Part no.	3R6794
Shanks	3

(8) *Capacities.*

Radiator	12 gal.
Fuel tank	115 gal.
Hydraulic system	148 qt.
Engine crankcase (incl. filters)	29 qt.
Transmission	124 qt.
Winch	38 qt.
Final drive (ea).	36 qt.

(9) *Specific nut and bolt torque data*

Component	*Ft. lb.*
Air cleaner	20±5
Hub retaining nut	1100-1200
Lubrication system breather bolt	10±2
Transmission oil cooler cap hub screws	75±10
Valve cover bolts	6-10
Ripper mounting bracket stud nuts	1500

(10) *Valve adjustments.*

Intake	0.015 in.
Exhaust	0.025 in.

(11) *Torque and engineering data.*

Bolts and nuts.

Size (inches)	*Torque (ft-lb)*	*Size (inches)*	*Torque (ft-lb)*
¼	9±3	¾	265±35
5/16	18±5	7/8	420±60
7/16	32±5	1	640±80
½	75±10	1¼	1000±120
9/16	110±15	1⅜	1200±150
⅝	150±20	1½	1500±200

Taper lock studs.

¼	5±2	¾	110±15
5/16	10±3	7/8	170±20
⅜	20±3	1	260±30
7/16	30±5	1⅛	320±30
½	40±5	1¼	400±40
9/16	60±10	1⅜	480±40
⅝	75±10	1½	550±50

Hydraulic valve bolts and nuts

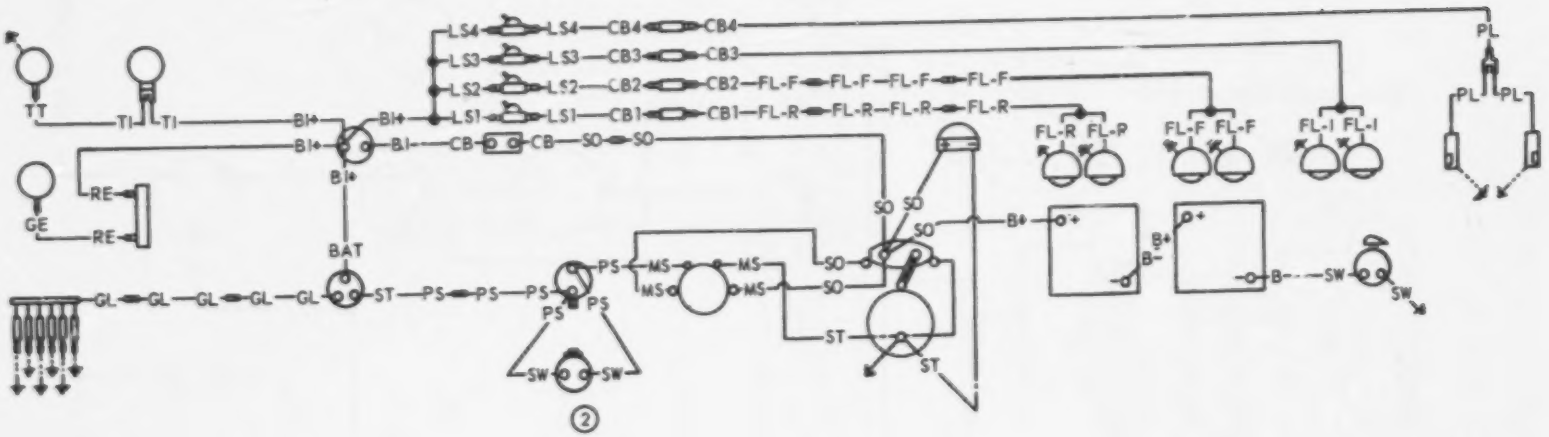
5/16	13±2	½	60±3
⅜	24±2	⅝	118±4
7/16	39±2		

(12) *Electrical system schematic diagrams.* The electrical system components and circuits are shown in figure 1-1.

LEGEND:	NOMENCLATURE
FL-F	FLOOD LIGHT-FRONT
FL-R	FLOOD LIGHT-REAR
PS	PRESSURE SWITCH
GL	GLOW PLUG
SO	SOLENOID
CB1	CIRCUIT BREAKER

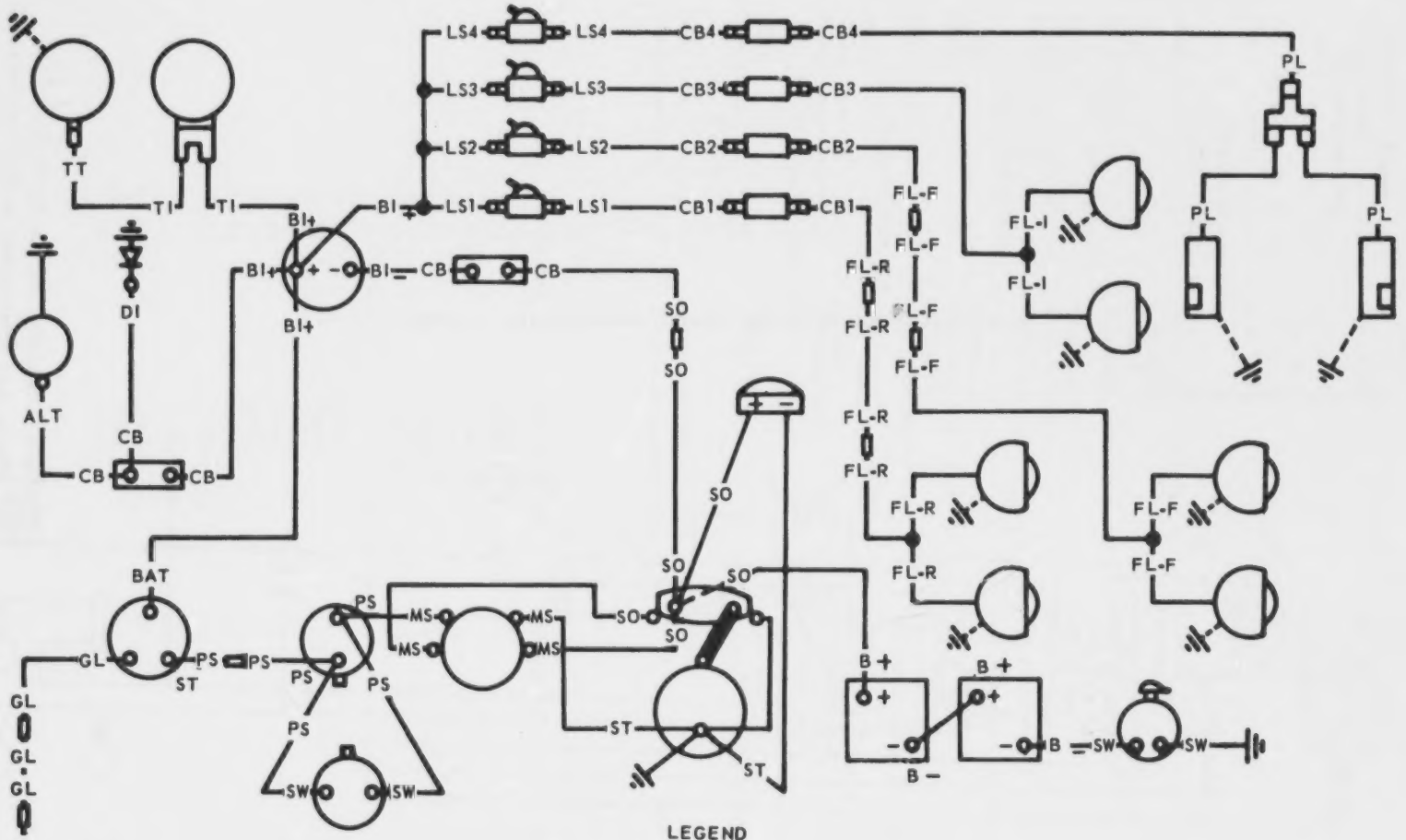
LEGEND	NOMENCLATURE
CB2	CIRCUIT BREAKER
ST	STARTER
LS	LIGHT SWITCH
CB	CIRCUIT BREAKER
GE	GENERATOR
RE	REGULATOR

LEGEND	NOMENCLATURE
SW	SWITCH
PL	PANEL LIGHTS (INSTRUMENT)
BI	AMMETER
TI	TEMPERATURE LIGHT INDICATOR
TT	TEMPERATURE SENDING UNIT
MS	MAGNETIC SWITCH



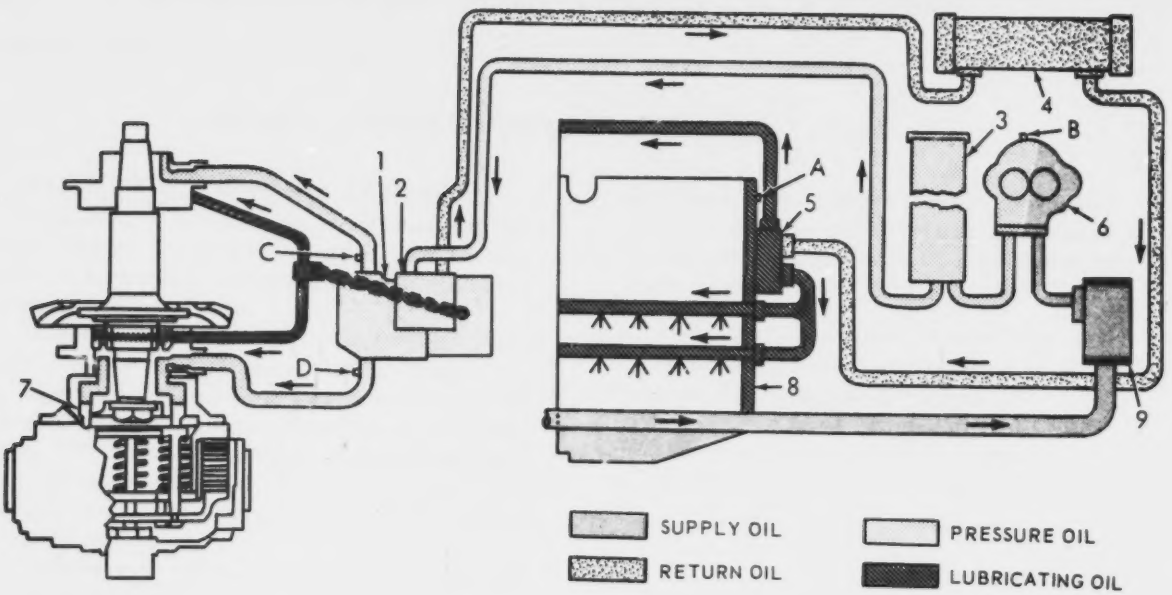
ME 2410-233-20/1-1 ①

Figure 1-1. Electrical system schematic diagram (generator) (sheet 1 of 2).



ME 2410-233-20/1-1 (2)

Figure 1-1. Electrical system schematic diagram (alternator) (sheet 2 of 2).



1-Steering clutch hydraulic control valve. 2-Steering clutch hydraulic control pressure relief valve. 3-Oil filter. 4-Oil cooler. 5-Transmission lubrication regulator valve. 6-Hydraulic oil pump. 7-Steering clutch piston. 8-Transmission case. 9-Magnetic strainer. A-Transmission lubricating oil pressure tap. B-Hydraulic oil pump pressure tap. C-Left steering clutch oil pressure tap. D-Right steering clutch oil pressure tap.

ME 2410-233-20/1-2

Figure 1-2. Transmission oil system.

CHAPTER 2

ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

Section I. SERVICE UPON RECEIPT OF MATERIEL

2-1. Inspecting and Servicing Equipment

a. Inspect the tractor for loose connections, broken lines or fittings, tightness of attachments, security of mountings, and freedom of operation of all controls and switches.

b. Inspect all wiring for loose terminal connections, frayed insulation, or broken wires.

c. Check and fill cooling system if necessary with clean-soft water or approved antifreeze solution. Refer to TB 750-651 for proper mixture of coolant. Allow room for expansion of coolant.

d. Lubricate tractor in accordance with current lubrication order.

e. Perform preventive maintenance checks and services, table 2-1.

2-2. Installation of Separately Packed Components

a. Batteries. The batteries are located in the battery box on the left side of the tractor (fig. 2-26). The batteries are shipped in dry state and the electrolyte is shipped in a separate container. For service and test refer to TM 9-6140-200-15. Fill and connect batteries as described below.

(1) Be sure disconnect switch is in OFF position.

(2) Fill battery cells with electrolyte to ⅜-inch above separators and install caps.

(3) Install short cable to connect batteries (+) to (—) for series battery operation.

(4) Install starter-to-battery cable to positive (+) terminal of battery.

(5) Install battery-to-disconnect switch cable to negative (—) terminal of battery.

(6) Tighten all clamps securely to battery posts.

(7) Connect the generator-to-regulator cable at the generator.

CAUTION

If batteries require charging, disconnect battery cables before using charger. The battery slave connector may be used to start the tractor if there is insufficient power in the batteries to turn engine over.

b. Moldboard and Push Beams (Fig. 2-1).

(1) Raise and block push beams so that they will be on line with the trunnions.

(2) Remove push beam caps.

(3) Drive tractor between beams.

(4) Install beams on trunnions and install beam caps.

NOTE

When installing lift cylinder rod to dozer blade, the ¼-inch thick spacers must be installed on side with capscrew head.

(5) Release lift cylinders from locks and lower enough to attach piston rods to rear of moldboard. Secure piston rods in place with pins.

(6) Connect tilt cylinder hydraulic lines.

(7) Fill hydraulic lines by operating cylinders until they operate smoothly without jerking or dropping. Operate tilt cylinder in same manner being careful not to over-extend piston rod.

c. Ripper. On tractors issued with rippers, the rippers are stored in inverted position.

(1) Support shanks with suitable cable, remove shank pins, and remove shanks.

(2) Raise ripper beam high enough to insert ripper shanks in beam, install shanks, and secure with pins.

(3) Lubricate hinge points and operate ripper thru several raising and lowering cycles to properly distribute lubricant and hydraulic oil in cylinders.

(4) Check hydraulic tank level for FULL mark level before working tractor.

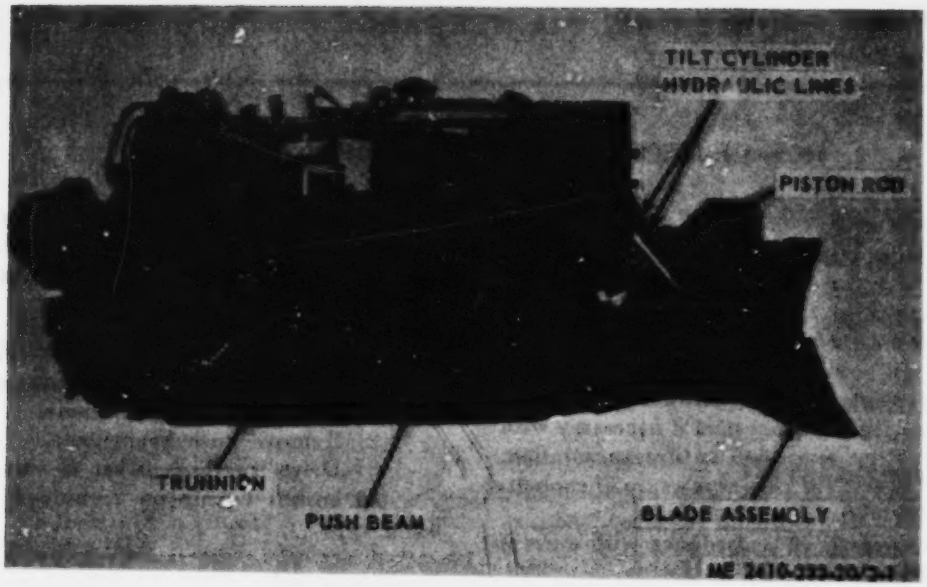


Figure 2-1. Moldboard and push beam.

Section II. MOVEMENT TO A NEW WORKSITE

When it is necessary to move to a new location, the tractor is shipped as a complete unit. The tractor may travel for short distances under it's own power or it may be trailered or moved on a railroad flatcar. When trailered or moved by flatcar, the tractor should be securely tied at the tiedown points and blocked (both front and rear) to prevent movement. When moving the tractor long distances, prepare it for movement as prescribed in TM 740-90-1.

Section III. PREPAIR PARTS, SPECIAL TOOLS AND EQUIPMENT

2-3. Special Tools and Equipment

Special tools required for organizational maintenance are listed in Appendix B. Common tools required by organizational maintenance personnel are authorized in the unit TO and E.

2-4. Maintenance Repair Parts

Repair parts and equipment are listed and illustrated in the repair parts and special tools list covering organizational maintenance for the tractor.

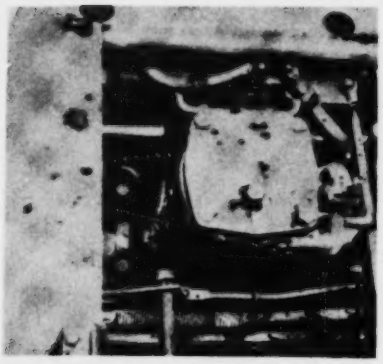
Section IV. LUBRICATION INSTRUCTIONS

2-5. General

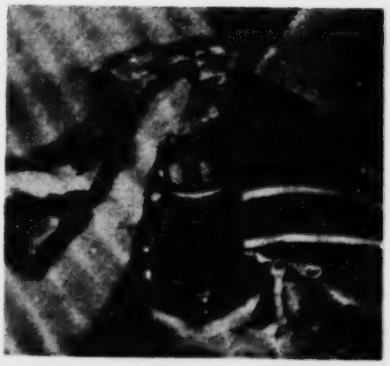
This section contains instructions for the maintenance of the filters, screens, reservoirs, and adjustments of the equipment that are concerned with the lubrication requirements of the tractor. See lubrication order.

2-6. Transmission Servicing

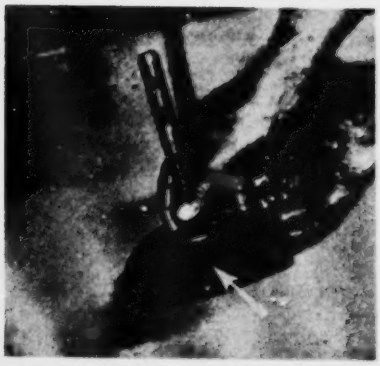
Every 250 hours of operation, service the transmission hydraulic system as described on figure 2-2 (1) Every 1000 hours of operation, perform the additional services described on figure 2-2 (2). See lubrication order.



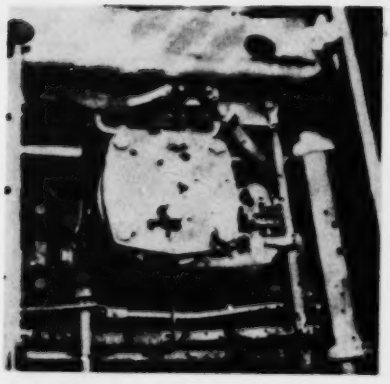
1. Remove seat. Remove filter drain plug.



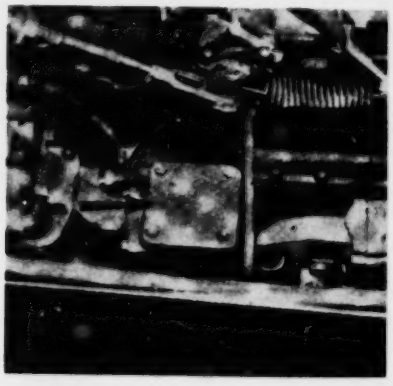
2. Remove cover and filter element



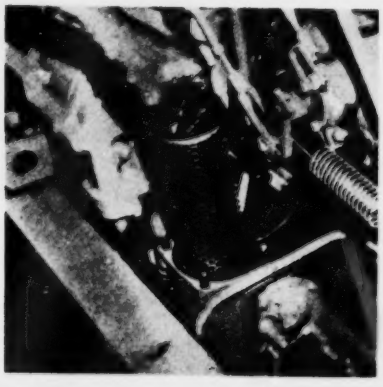
3. Inspect cover seal. Install new seal if necessary.



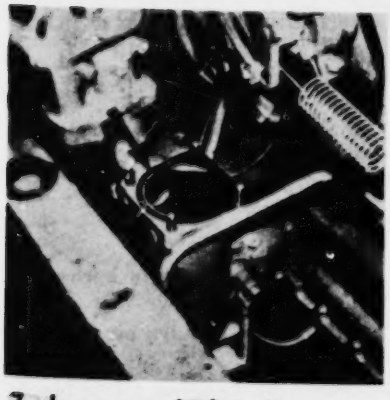
4. Install new element. Install cover and drain plug.



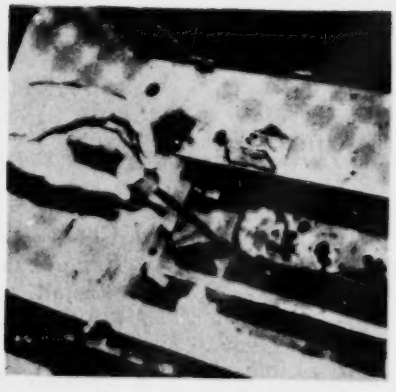
5. Remove cover and spring from strainer.



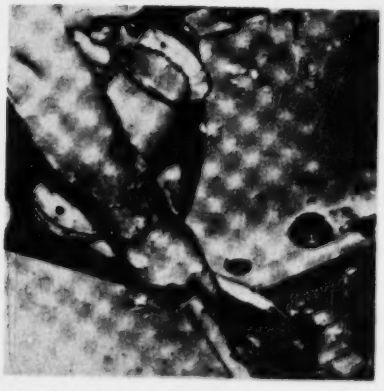
6. Remove screen and magnets. Wash screen in clean kerosene. Clean magnets with a stiff bristle brush or clean cloth. Do not drop or rap magnets.



7. Inspect seal. Install a new one if necessary. Install magnets, screen, spring and cover.



8. Check oil level. Oil level should be at FULL mark on gauge.



9. Add oil if necessary.

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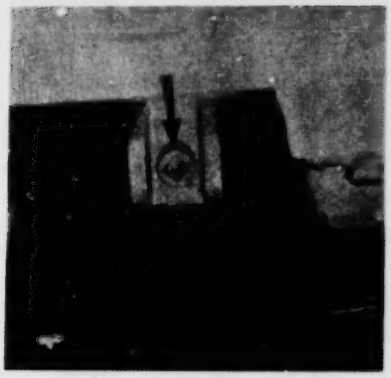
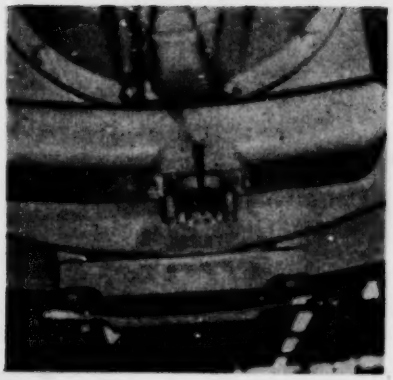
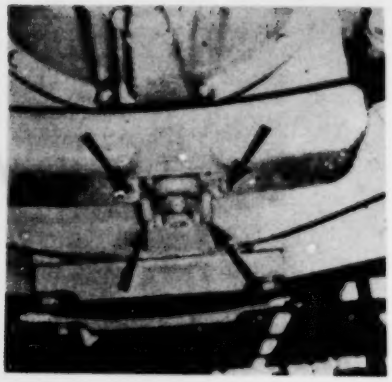
Figure 2-2. Transmission servicing (sheet 1 of 2).



1. Oil should be warm before draining. Remove drain plugs from bevel gear case, converter housing, and oil cooler.





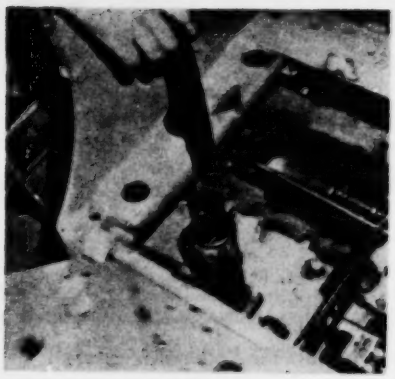
2. Remove cover and screen from converter housing.

3. Wash screen in clean kerosene. Install screen and cover.

4. Change filter elements. Wash magnetic strainer.

5. Install bevel gear, converter, and oil cooler drain plugs.

6. Remove old breather and install a new one



7. Fill compartment. Refill capacity on lubrication order. Start engine and check oil level. Oil should be up to FULL mark on gauge.

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Figure 2-2. Transmission servicing (sheet 2 of 2).

2-7. Hydraulic System Servicing

Every 500 hours of operation, service the hydraulic control system as described on figure 2-3. Every 2000 hours of operation, service the hydraulic tank as follows:

a. Position tractor so the hydraulic cylinders can move a complete stroke. Raise equipment to top of travel.

b. Stop engine. Remove fill cap and open drain valve and drain all oil.

c. Lower all equipment and close drain valve after oil has stopped running.

d. Change the oil filter element.

e. Remove the filler strainer, wash in kerosene, and reinstall.

f. Fill hydraulic tank to FULL mark on dipstick gage.

g. Open bleed valve and start engine. Close bleed valve when oil flows without bubbles.

h. Raise and lower equipment through several cycles to fill and purge cylinders.

i. Position tractor on level surface. Check oil level and add oil as required.

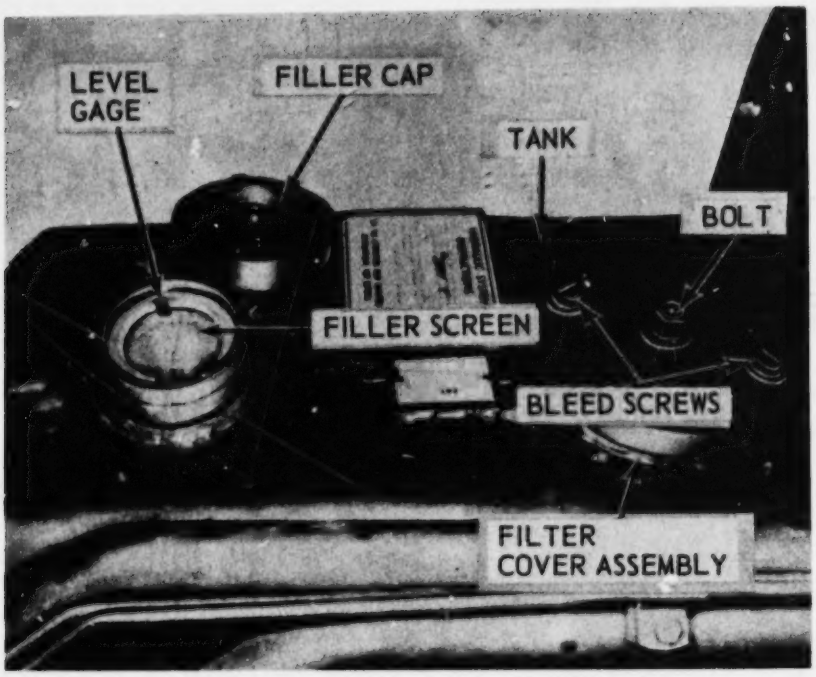

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Figure 2-3. Hydraulic system servicing.

2-8. Engine Lubrication Servicing

a. Run engine long enough to warm the oil. Stop engine. Remove oil drain access cover from crankcase guard. Open oil drain valve. Remove filter drain plugs.

b. Remove filter lower hex bolts (fig. 2-4) and remove and discard elements.

c. Wipe filter body clean with lint-free cloth.

d. Check cover seal. Install new seal if necessary.

e. Install new filter elements. Install filters to cover and secure with cover bolts.

f. Install filter and drain plugs. Close drain valve. Install oil drain access cover.

g. Remove the breather and wash in clean kerosene or cleaning solvent.

h. Check the breather seal. Install breather and tighten bolt to 10±2 ft.-lb. torque.

i. Fill engine with oil specified on lubrication order for temperature range.

j. Start engine and allow filters to fill. Check for seal leaks at filters. Fill crankcase to FULL mark on dipstick gage.

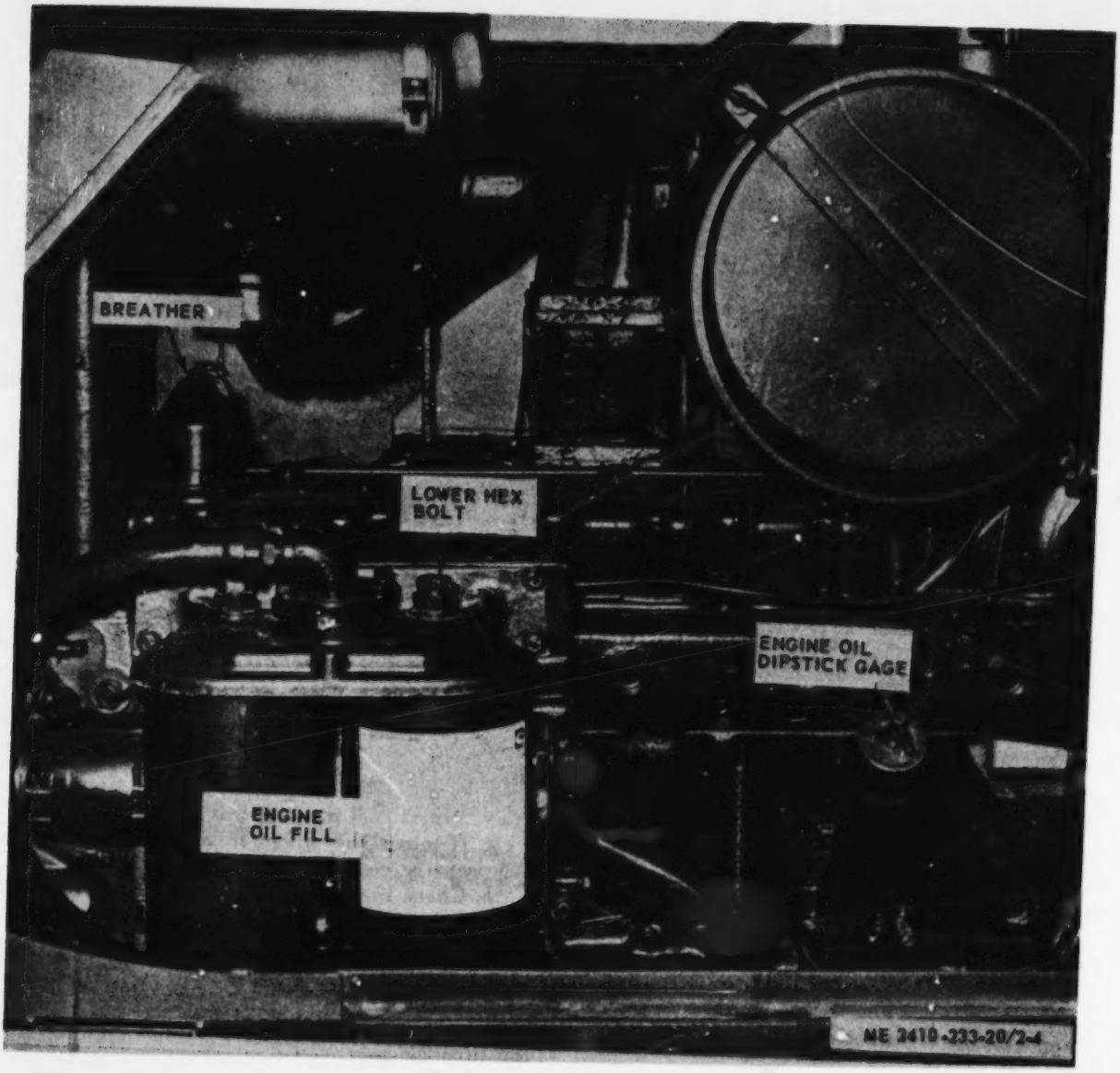


Figure 2-4. Engine oil system servicing.

2-9. Fuel System Servicing

Service the fuel system each 100 hours of operation or when pressure gage reads OUT. whichever occurs first.

a. Close fuel supply valve on bottom of tank.

b. Open petcock and vent fuel line at pump.

c. Remove the cover bolt (fig. 2-5) and remove final filter housing and element. Discard the element and gasket.

d. Clean inside of filter body with lint-free cloth.

e. Lubricate new gasket with clean fuel oil. Install new element in filter cover. Install gasket and cover and secure with cover bolt.

f. Loosen bail nut and remove primary fuel filter assembly.

g. Wash element and bowl in kerosene and reinstall element and bowl. Secure with bail.

h. Open tank drain valve and drain off any water in bottom of tank.

i. Open fuel valve on tank and prime fuel system with priming pump. When fuel flow from petcock is ree of air bubbles, close petcock.

j. Service fuel tank filler cap (fig. 2-6).
k. Start engine and check filters for leaks.

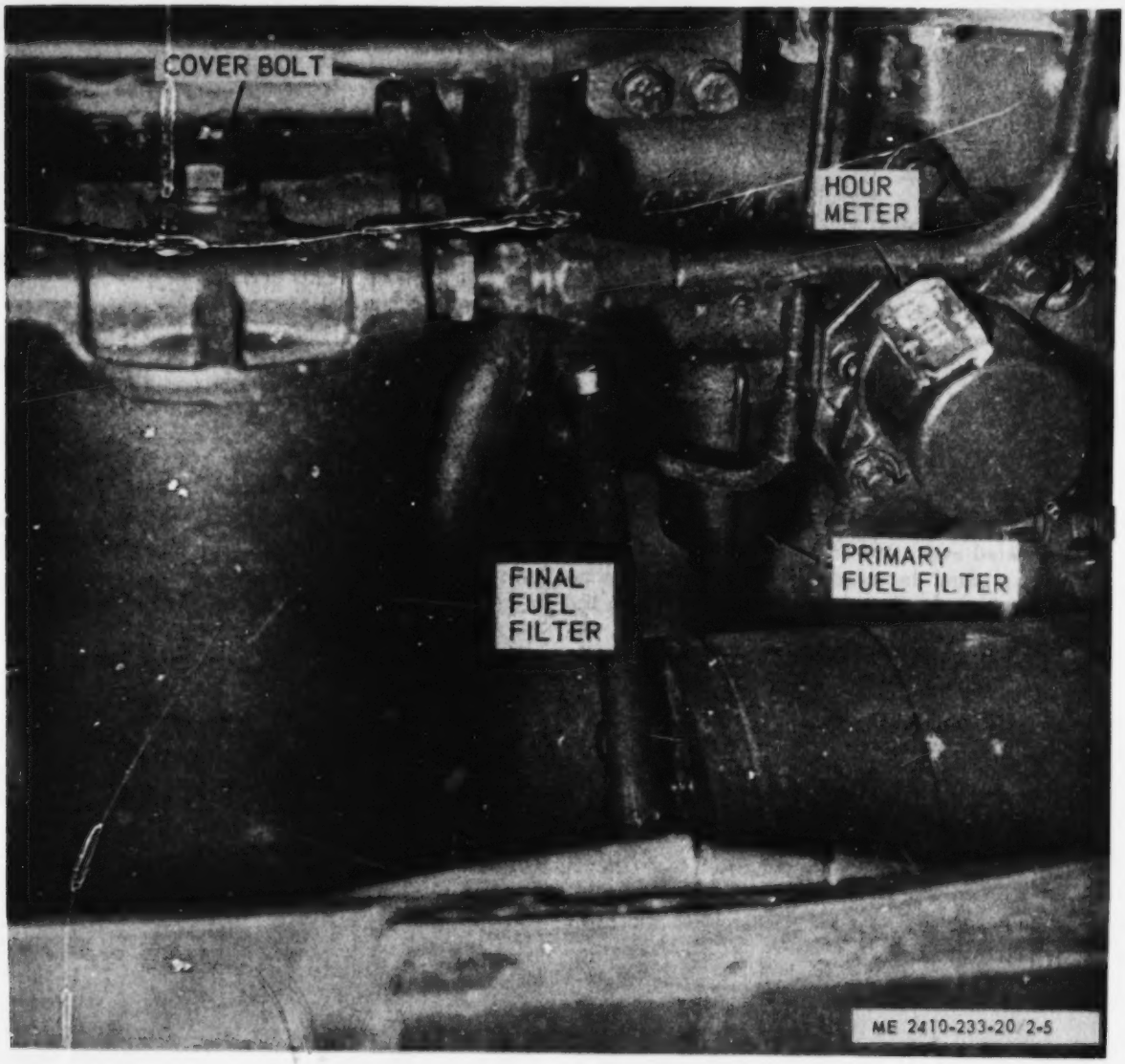
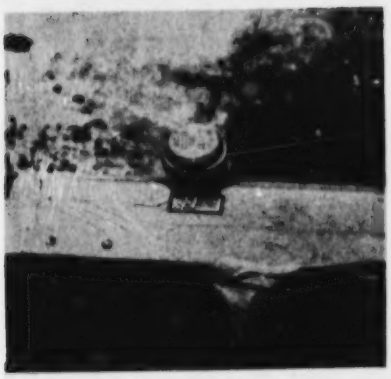


Figure 2-5. Fuel filter servicing.



1. Remove and disassemble cap.

2. Wash cap and elements in clean kerosene.

3. Oil elements lightly. Assemble and install cap.

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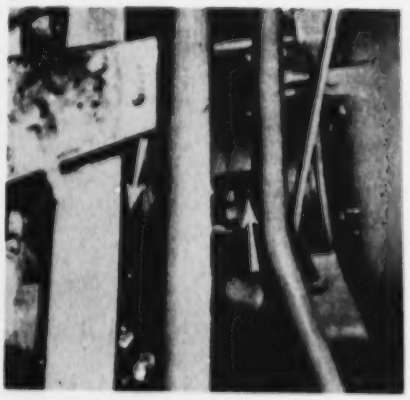
Figure 2-6. Fuel tank filler cap servicing.

2-10. Propeller Shaft Universal Joint

The propeller shaft universal joint (fig. 2-7) should be lubricated every 1000 hours of operation. With the transmission in neutral, rotate the universal joint and check for looseness of bearing caps on the cross pieces. If bearing caps show looseness, the assembly should be replaced as worn needle bearings can hang up and cause the shaft to separate and damage the splines which would require teardown of the transmission. Report to direct support maintenance for replacement of the universal joint.



Lubricate 2 fittings.

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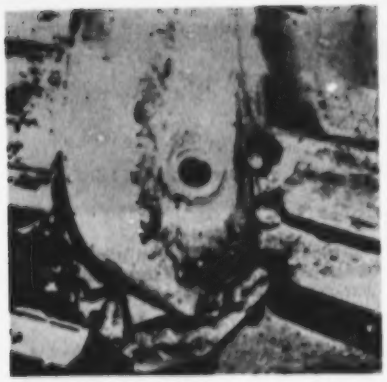
Figure 2-7. Universal joint servicing.

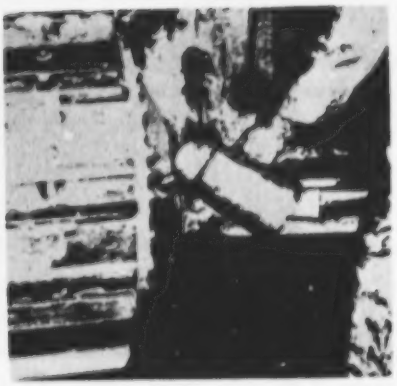
2-11. Final Drive Servicing

Every 1000 hours of operation, or as recommended in LO 5-2410-233-12 / 1 / 2, service the final drive as described in figure 2-8. Service every 500 hours of operation when operating in extremely dusty conditions or in deep mud or water.



1. Remove fill and drain plugs and allow oil to drain.

2. If oil has been contaminated with water or mud, fill drive to proper level with kerosene or diesel oil. Drive tractor back and forth for 5 minutes, then drain oil.



3. Install drain plugs. Add oil to level of filler plug openings. (See lubrication order for type and grade). Install filler plugs.

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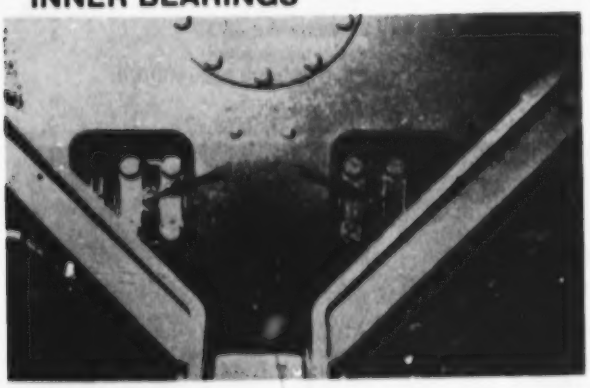
Figure 2-8. Final drive servicing.

2-12. Track Servicing

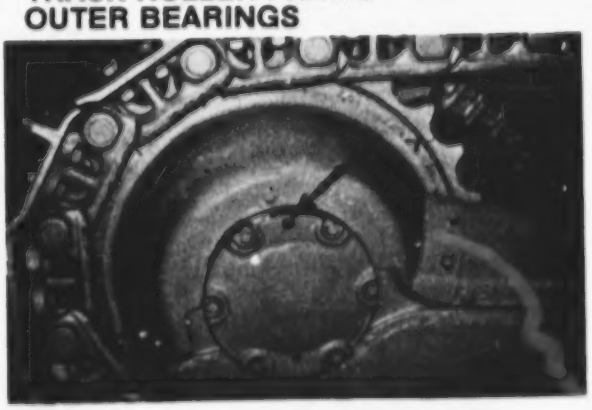
Every 10 hours of operation service the track roller frame bearings as described on figure 2-9. Every 50 hours of operation check the track adjustment as described in figure 2-10.

TRACK ROLLER FRAME INNER BEARINGS



Lubricate 2 fittings.

TRACK ROLLER FRAME OUTER BEARINGS

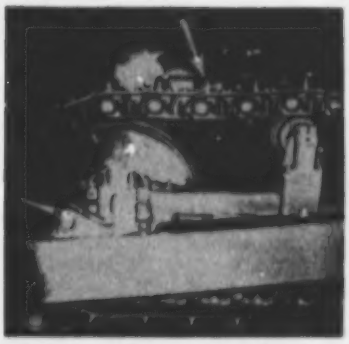


Lubricate 1 fitting on each side of tractor. (5 strokes each) Remove relief plug.

ME 2410-233-20/2-9

Figure 2-9. Track roller frame bearing servicing.

TRACK



Check adjustment. Correct adjustment allows 1 to 1½ inches (25 to 38 mm) sag at this point.

If Track is Too Tight:

1. Be sure front idler can retract. Raise inspection plate.

If Track is Too Loose:

1. Raise inspection plate and add multipurpose-type grease through fill valve until adjustment is correct.

Caution
Do not attempt to tighten track when stop on adjusting rod is within 1/16 inch (1,6 mm) of stop on roller frame.

2. Operate tractor back and forth to equalize pressure.

3. Recheck adjustment.

2. Loosen relief valve 1 turn to allow grease to escape.

WARNING
Never visually inspect relief valve or fill valve to see if grease is escaping. Always observe the track to see if it has loosened.

3. Tighten valve when adjustment is correct. Operate tractor back and forth to equalize pressure.

4. Recheck adjustment.

If Track Did Not Loosen:

1. Remove guard and loosen fill valve 1 turn. Operate tractor back and forth.

2. Loosen relief valve until it touches guard.

3. Loosen fill valve until it touches guard.

4. Tighten fill and relief valves when adjustment is correct.

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Figure 2-10. Track adjustment.

Section V. PREVENTIVE MAINTENANCE CHECKS AND SERVICES

To insure that the tractor is ready for operation at all times, it must be inspected systematically so that defects may be discovered and corrected before they result in serious damage or failure. The preventive maintenance checks and services to be performed are listed on table 2-1. All deficiencies and shortcomings will be recorded with corrective action taken on DA Form 2404 at the earliest opportunity.

Table 2-1. Organizational preventive maintenance checks and services.

Q—Quarterly

Sequence number	ITEM TO BE INSPECTED PROCEDURE	Work time (M H)
	ENGINE	
*1	**BATTERIES** Clean top of batteries. Check electrolyte level. At proper generator / alternator charging rate, batteries will not require more than 1 ounce water per cell per week. Inspect terminals for corrosion and tightness. Check specific gravity of electrolyte with hydrometer. Fully charged batteries read between 1.270 and 1.285. Charge or replace batteries when reading is below 1.240 (para 2-34).	0.4
*2	**TRACK** Check adjustment. Correct adjustment allows 1-to 1½-inches sag at point midway between front support roller and idler (para 2-12). Inspect track, link pins, and bushings for wear. Check idlers for loose mounting, leaking seals, and wear. Remove guards and check equalizer bar support pads for cracks or peel. Report to direct support maintenance for replacement.	0.6
*3	**FAN BELTS** Check condition of belts. Check adjustment. Correct adjustment is 7 / 8-inch deflection midway between pulleys. Initial installation with new belts is ¾-inch deflection (para 2-24).	0.8
4	**STEERING CLUTCH BRAKES** Check adjustment. Adjust brakes (para 2-41).	0.5
5	**HYDRAULIC TANK—FILTER** Replace filter. Clean tank if oil is contaminated (para 2-7).	0.5
6	**DIESEL TANK SERVICE** Service filler cap (para 2-9).	0.5
7	**ENGINE VALVE ADJUSTMENT** Check valve adjustment if excessive valve noise or loss of power is noticed (para 2-20). Check to see if oil is being delivered to valve mechanism. Check cover and gasket for good condition. Replace valve cover gasket if found to be defective.	2.5 0.6
8	**SPROCKET HUB BEARINGS** Check bearings for noticeable movement. Adjust bearings (para 2-42).	2.0
9	**HYDRAULIC PUMPS** Check all pumps for leaks. Inspect hoses and lines for deterioration and damage.	0.2
10	**TRANSMISSION** Inspect transmission and torque divider for leaks. Service transmission (para 2-6).	0.1

Table 2-1. Organizational preventive maintenance checks and services
(Continued)

Sequence number	ITEM TO BE INSPECTED PROCEDURE	Work time (M/H)
11	FINAL DRIVE Inspect housing for leaks. Check oil for level and contamination (para 2-11).	1.0
12	RADIATOR Check coolant level. Check for antifreeze protection when temperature is at or below +32°F.	0.1
13	DOZER Inspect cutting edges and end bits for wear (para 2-52). Check sockets and mounting pins for wear.	0.2
14	WINCH Check oil level in transmission (para 2-14). Adjust brake band (para 2-55).	0.6
15	RIPPER Check for insecure mounting, damaged hoses, and leaks at cylinders (para 2-59).	0.3
16	TRACTOR Check tractor for loose or missing nuts, bolts, and damaged parts.	0.5
17	DATA AND INSTRUCTION PLATES Inspect to see if plates are legible and fastened securely. Replace defective plates.	0.2
18	WIRING HARNESS Inspect wiring for breaks or defective connectors. If defective report to direct support maintenance.	0.5
19	CYLINDER BLOCK Inspect cylinder block for cracks or leaks. If cylinder block is damaged report condition to general support maintenance.	0.2
20	CRANK SHAFT PULLEY Inspect crankshaft pulley for looseness or other defects. Replacement of crankshaft pulley will be accomplished by direct support maintenance personnel.	0.2
21	FRONT ENGINE MOUNT Inspect front engine mount for crack or other defects. Replacement or repair of engine mounts will be accomplished by direct support personnel.	0.3
22	TRACK FRAME Inspect track frame for a cracked or sprung condition. If track frame is sprung it should be reported to depot maintenance personnel.	0.3
23	TRACK CARRIER ROLLERS Inspect the track carrier rollers for cracks or other obvious damage. When the contact surface wear or flange wear exceeds ¼-inch or the roller is otherwise damaged, it must be replaced by direct support personnel.	0.2
24	TRACK SUPPORT ROLLER Inspect track support rollers for cracks or other obvious damage. If damaged, rollers must be replaced by direct support maintenance personnel.	0.2
25	TRACK DRIVE SPROCKET Inspect track drive sprocket for broken teeth or other obvious damage. If track drive sprocket is damaged it must be replaced by direct support maintenance personnel.	0.4
26	FINAL DRIVE CASE Inspect final drive gear case for cracks or leaks. If damaged gear case must be replaced by depot maintenance personnel.	0.2

Table 2-1. Organizational preventive maintenance checks and services
(Continued)

Sequence number	ITEM TO BE INSPECTED PROCEDURE	Work time (M / H)
27	EXHAUST MANIFOLD Inspect the manifold for loose mounting bolts or a blown manifold gasket condition. Defective exhaust manifold should be reported to direct support maintenance personnel.	0.2
28	RELIEF VALVE (TORQUE CONVERTER) Inspect relief valve for leaks or any other visible signs of damage. Damaged relief valve should be reported to general support maintenance personnel.	1.0
29	TRACK ADJUSTER CYLINDER Inspect cylinder for leaks. Inspect recoil spring for damage and distortion. Report a damaged track adjuster mechanism to direct support maintenance personnel.	0.5
30	TRACK IDLER AND ADJUSTMENT Inspect idler yoke assembly for cracks, breaks, distortion, and other damage. Report a damaged yoke assembly to direct support maintenance personnel.	0.5
31	FUEL TANK Inspect fuel tank for leaks. Inspect screen for holes. If screen is damaged, it must be replaced. Report a damaged tank to direct support maintenance.	0.2

LEGEND * To be accomlished weekly instead of monthly.

Section VI. TROUBLESHOOTING

This section provides information useful in diagnosing and correcting unsatisfactory operation or failure of the tractor and its components. Malfunctions which may occur are listed in table 2-2. Each malfunction stated is followed by a list of tests or inspections to isolate the cause of the trouble. The corrective action recommended to remedy the malfunction follows the test or inspection.

Table 2-2. TROUBLESHOOTING

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
1. ENGINE FAILS TO START
Step 1. Check to see if there is air in fuel system. Prime fuel system.
Step 2. Check to see if engine is too cold. Use starting aid.
Step 3. Check to see if fuel tank is empty. Fill fuel tank.
Step 4. Inspect fuel filters to see if they are clogged. Clean primary filters. Replace element in final filter (para 2-9).
Step 5. Check to see if injectors are clogged. Report to direct support maintenance.
Step 6. Check to see if fuel transfer pump is defective. Replace fuel transfer pump (para 2-21).

Table 2-2. TROUBLESHOOTING (Continued)

MALFUNCTION / TEST OR INSPECTION	CORRECTIVE ACTION
2. IRREGULAR ENGINE FIRING	
Step 1. Check to see if fuel filter elements are clogged.	Clean primary filter element. Replace element in final filter.
Step 2. Inspect air cleaner to determine if it is clogged.	Service air cleaner (para 2-19).
Step 3. Check to see if there is air in fuel system.	Prime fuel system.
Step 4. Inspect injectors to see if they are defective.	Report to direct support maintenance.
Step 5. Check inlet and exhaust valve clearances.	Adjust valves (para 2-20).
3. ENGINE SMOKES	
Step 1. Check to see if air cleaner is clogged.	Service air cleaner (para 2-19).
Step 2. Inspect injectors to see if they are defective.	Report to direct support maintenance. If compression gage indicates rings are worn, notify direct support maintenance.
4. ENGINE OVERHEATING	
Step 1. Check to see if coolant level is low.	Add coolant to system.
Step 2. Check to see if fan belt is loose.	Adjust belt (para 2-24).
Step 3. Check to see if radiator is clogged.	Clean radiator.
Step 4. Inspect thermostat to determine if it is defective.	If thermostat is defective when tested, replace thermostat (para 2-22).
Step 5. Tractor has been under continuous load.	Reduce load.
Step 6. Check to see if radiator sealed pressure overflow is defective.	Clean or replace (para 2-22).
Step 7. Check to see if there is a sufficient air flow.	Adjust fan blade angle (para 2-23).
5. ENGINE KNOCKS EXCESSIVELY	
Step 1. Check to see if engine oil level is low.	Add oil to proper level.
Step 2. Check for defective injector.	Report to direct support maintenance.
6. LOW OR NO LUBRICATING OIL PRESSURE	
Step 1. Check to see if engine oil level is low.	Fill crankcase to proper level.
Step 2. Check for leaking connections.	Report to direct support maintenance.
7. LOW OR NO FUEL PRESSURE INDICATION	
Step 1. Check to see if fuel filters are clogged.	Clean element in final filter (para 2-9).
Step 2. Check to see if there is air in fuel system.	Prime fuel system.
Step 3. Check to see if fuel pressure gage is defective.	Replace gage.
8. STARTER WILL NOT CRANK ENGINE	
Step 1. Check to see if batteries are weak.	Test batteries by using a hydrometer, change batteries (para 2-34).

Table 2-2. TROUBLESHOOTING (Continued)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
8. STARTER WILL NOT CRANK ENGINE (Continued)
Step 2. Check for loose connections on defective wiring. Wiring requiring replacement, refer to direct support maintenance.
Step 3. Check to see if commutator is dirty or worn. Clean commutator if dirty. Replace starter (para 2-32) if commutator is worn.
Step 4. Check to see if disconnect switch is faulty. (Replace switch (para 2-37).
9. GENERATOR / ALTERNATOR NOT CHARGING
Step 1. Generator drive belts loose or broken. Adjust belts (para 2-24). If a belt is broken, replace belts as matched set.
Step 2. Check to see if generator regulator is inoperative. If generator regulator is inoperative, report to direct support maintenance.
Step 3. Check to see if generator / alternator is inoperative. Replace generator (para 2-30) or alternator (para 2-31).
10. GENERATOR / ALTERNATOR OUTPUT LOW OR UNSTEADY
Step 1. Check to see if generator belts are properly adjusted. Adjust belts (para 2-24).
Step 2. Check to see if brush spring tension is too low. Report to direct support maintenance.
Step 3. Inspect commutator to see if it is dirty or worn. Clean commutator if dirty. Replace generator (para 2-30) if commutator is worn.
Step 4. Inspect generator regulator to see if it is working properly. Report to direct support maintenance.
11. FULLY CHARGED BATTERY AND A HIGH CHARGING BATTERY
Step 1. Check to see if voltage regulator setting is correct. Report to direct support maintenance.
Step 2. Check to see if regulator unit is defective. Report to direct support maintenance.
Step 3. Inspect for short circuit in generator regulator or wiring. Report to direct support maintenance.
Step 4. Inspect ground connection for tightness. Tighten connections.
12. BATTERIES WILL NOT HOLD CHARGE
Step 1. Check to see if terminal connections are loose. Tighten connections.
Step 2. Check for short in electrical system. Repair or replace defective part.
Step 3. Check for defective battery. If hydrometer indicates that the specific gravity of one cell is more than 0.025 lower than the other cells, then battery should be replaced.
13. HEADLIGHT OR DASH LIGHT WILL NOT LIGHT
Step 1. Check to see if bulb is burned out. Replace bulb.
Step 2. Check for defective circuit breaker. Replace circuit breaker.
Step 3. Check for loose connections. Tighten connections.
WINCH FAILS TO OPERATE AND IS SLUGGISH IN OPERATION
Step 1. Check to see if filter is plugged. Service filter (para 2-7).

Table 2-2. TROUBLESHOOTING (Continued

MALFUNCTION / TEST OR INSPECTION	CORRECTIVE ACTION
14. WINCH FAILS TO OPERATE AND IS SLUGGISH IN OPERATION (Continued)	
Step 2.	Check for loose connection in suction line.
	Tighten suction line.
Step 3.	Check for low oil level in winch transmission.
	Fill to correct level (LO).
Step 4.	Check for defective hydraulic pump.
	Replace pump (para 2-47).
15. WINCH BRAKE NOT HOLDING PROPERLY	
Step 1.	Check for water in brake compartment.
	Remove plug to drain compartment.
Step 2.	Check for improper brake band adjustment.
	Adjust brake band (para 2-54).
Step 3.	Check for oil on brake band.
	Clean or replace brake band.
Step 4.	Check for broken spring.
	Replace spring.
Step 5.	Check for sticky or damaged piston.
	Report to direct support maintenance.
Step 6.	Check for worn poppet or valve selector spool.
	Report to direct support maintenance.
16. WINCH CLUTCH PRESSURE LOW	
Step 1.	Check for improper adjustment on push-pull cable.
	Adjust cable (para 2-56).
Step 2.	Inspect for broken seal ring on bevel gearshaft.
	Report to direct support maintenance.
Step 3.	Inspect for damaged preformed packing in clutch pack.
	Report to direct support maintenance.
Step 4.	Inspect for damaged or worn pump.
	Replace pump (para 2-47).
Step 5.	Check for plugged filter.
	Clean filter.
17. RIPPER WILL NOT RAISE	
Step 1.	Check for low oil level.
	Add oil. (See L.O.)
Step 2.	Inspect hydraulic pump for failure.
	Replace pump (para 2-47).
Step 3.	Check for defective relief valve in hydraulic control.
	Report to direct support maintenance.
Step 4.	Check for improper relief valve setting.
	Report to direct support maintenance.
18. RIPPER WILL NOT LOWER	
Step 1.	Check for low oil level.
	Add oil. (See L.O.)
Step 2.	Check for defective relief valve in hydraulic control.
	Report to direct support maintenance.
19. RIPPER WILL NOT STAY IN GROUND	
Step 1.	Check for improper snank adjustment.
	Adjust shank.
Step 2.	Inspect cylinder piston rod packing and seals for a worn condition.
	Report to direct support maintenance.
20. TRANSMISSION DOES NOT OPERATE IN ANY SPEED	
Step 1.	Check oil level in transmission.
	Add oil.

Table 2-2. TROUBLESHOOTING (Continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION	
20. TRANSMISSION DOES NOT OPERATE IN ANY SPEED (Continued)	
Step 2.	Check for leakage in external connections. Check hoses, lines, and fittings and replace defective parts.
Step 3.	Check to see if pressure relief valve in hydraulic control valve is open. Report to direct support maintenance.
Step 4.	Check to see if pressure relief valve is improperly adjusted or spring broken. Report to direct support maintenance.
Step 5.	Inspect for a stuck check valve. Report to direct support maintenance.
Step 6.	Inspect to see if differential valve is sticking. Report to direct support maintenance.
Step 7.	Check control linkage for loose or broken condition. Report to direct support maintenance.
Step 8.	Check to see if safety valve is properly adjusted. Report to direct support maintenance.
Step 9.	Inspect torque divider for failure. Report to direct support maintenance.
21. TRACTOR REMAINS IN GEAR WITH SELECTOR LEVER IN NEUTRAL	
Step 1.	Check to see if directional clutch is releasing. Report to direct support maintenance.
Step 2.	Check to see if control linkage is properly adjusted. Report to direct support maintenance.
Step 3.	Control linkage loose or broken. Report to direct support maintenance.
Step 4.	Inspect speed and safety valve for proper adjustment. Report to direct support maintenance.

2-13. Lift Cylinder Servicing

Every 10 hours of operation, lubricate the lift cylinder supports and trunnions as illustrated on figure 2-11.

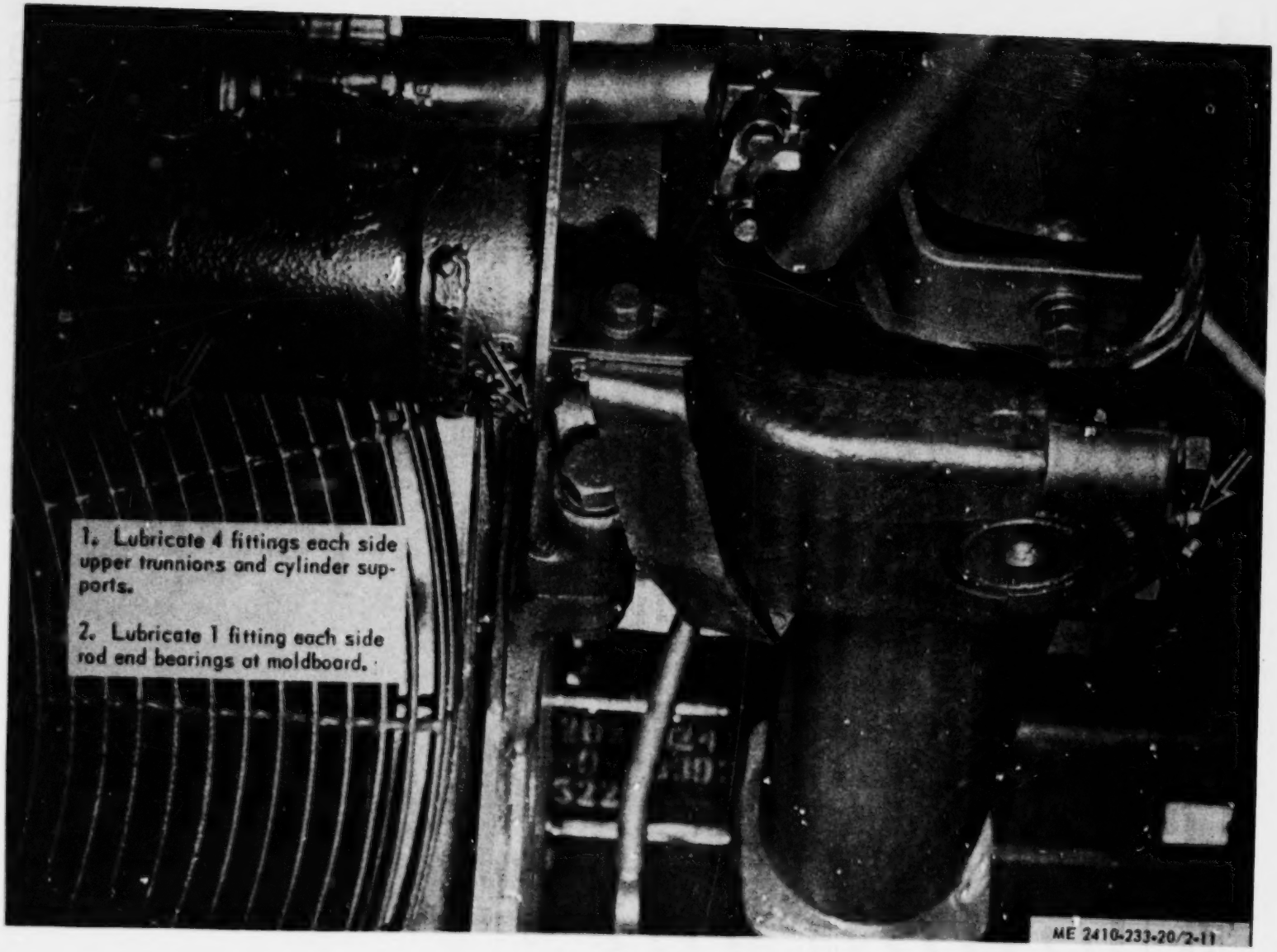
1. Lubricate 4 fittings each side upper trunnions and cylinder supports.
2. Lubricate 1 fitting each side rod end bearings at moldboard.
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Figure 2-11. Lift cylinder trunnion servicing.

2-14. Winch Oil Screen Servicing

Every 500 hours of operation, remove the winch oil screen and service it as described on figure 2-12. Every 1000 hours drain, flush, and refill winch with oil prescribed on the lubrication order.

CAUTION

Screen is screwed to suction line nipple. DO NOT overtighten when reinstalling screen.

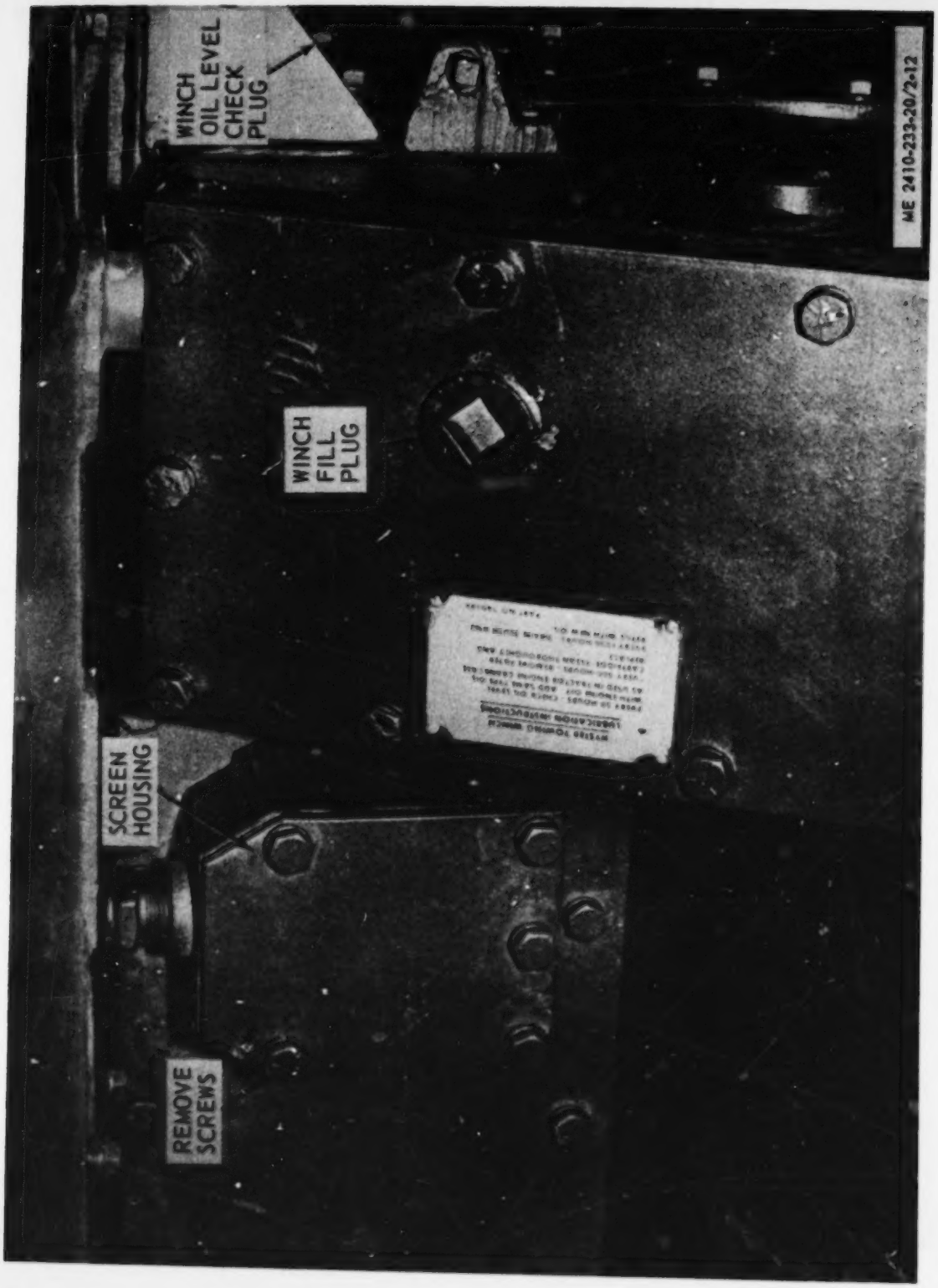


Figure 2-12. Winch oil screen servicing.

Section VII. RADIO INTERFERENCE SUPPRESSION

2-15. General Methods Used to Attain Proper Suppression

Essentially, suppression is attained by providing a low resistance path to ground for stray currents. The methods used include shielding high-frequency carrying wires, grounding the frame with bonding straps, and using capacitors.

2-16. Interference Suppression Components

a. Primary Suppression Components. The primary suppression components are those whose primary function is to suppress radio interference. These components are illustrated on figure 2-13.

b. Secondary Suppression Components. These components have radio suppression functions which are incidental and / or secondary to their primary function. They consist of external and internal tooth type lockwashers used to attach electrical components for better grounding.

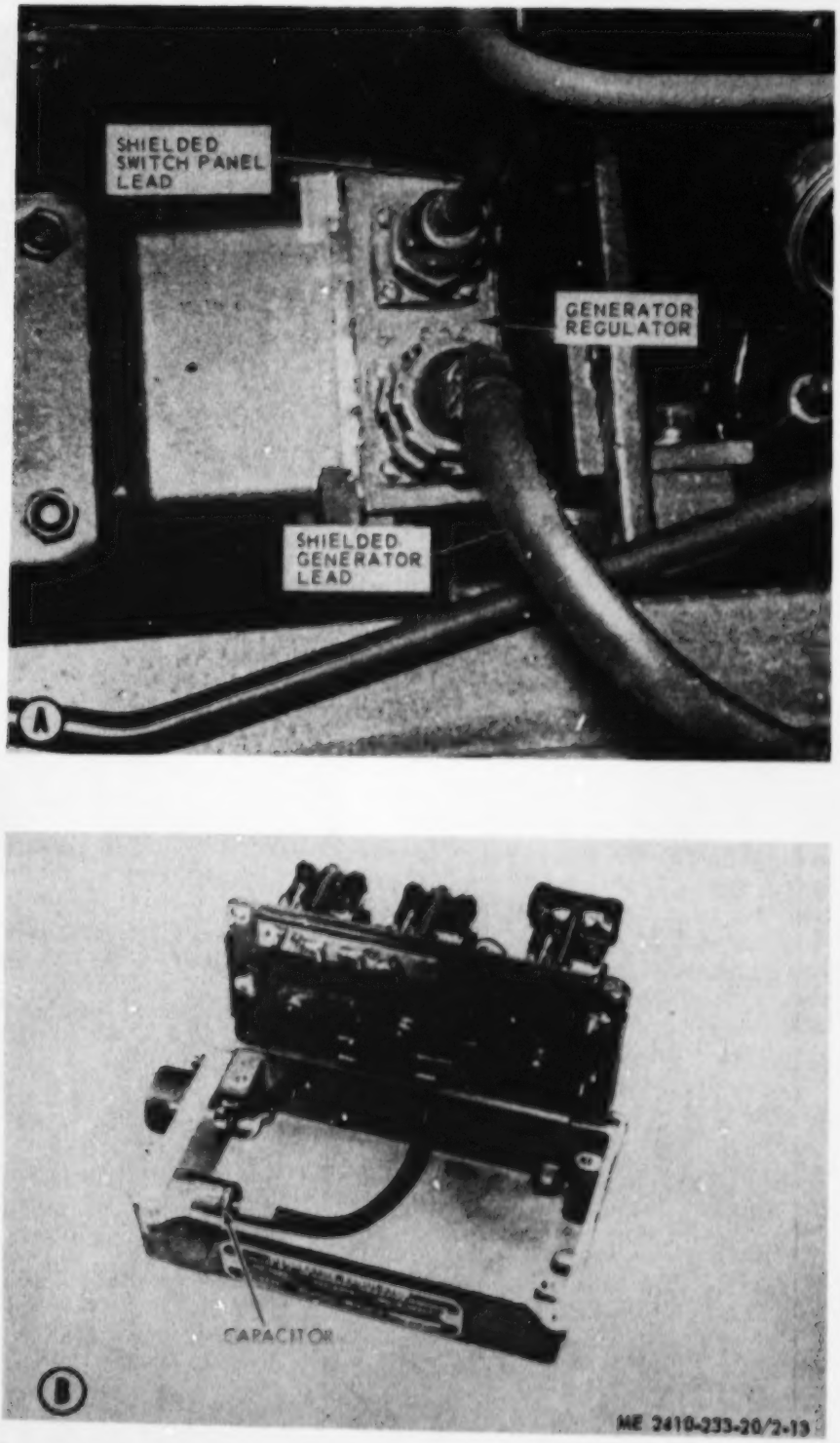


Figure 2-13. Radio interference suppression components.

2-17. Replacement of Suppression Components

Suppression components shown on figure 2-13 are replaced by removal of attaching hardware except for the capacitor which requires removal of the regulator cover and disconnecting the lead.

CAUTION

Do not pull on the cable or twist the braided shielding. Gently work the cable from side to side and free the rubber seal. Do not use sharp tools to install the seals.

2-18. Testing of Radio Interference Suppression Components

Test the capacitor for leaks and shorts on a capacitor tester. Replace defective capacitor. If test equipment is not available and interference is indicated, isolate cause of interference by trial-and-error method of replacing parts until the cause of interference is located and eliminated.

Section VIII. MAINTENANCE OF ENGINE

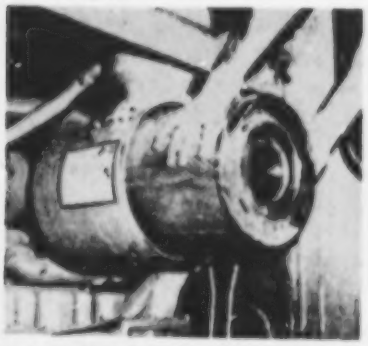
2-19. Air Cleaner Elements

Service the air cleaner elements whenever the air cleaner indicator indicates the necessity for cleaning. Refer to figure 2-14 for procedures to follow.

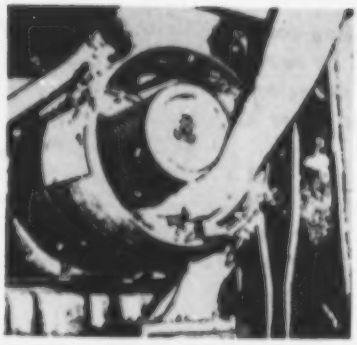
Servicing Primary Element

Service filter elements when RED band in indicator locks up.

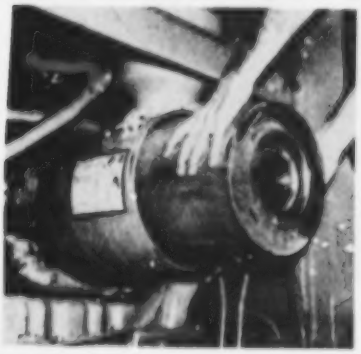
Never service air cleaner elements with engine running.



1. Remove cover and primary element.



2. Clean inside of air cleaner body.



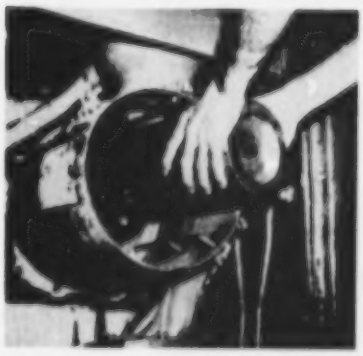
3. Clean and inspect element Fig. 2-14 (3). Install clean element.

4. Install cover. Reset indicator.

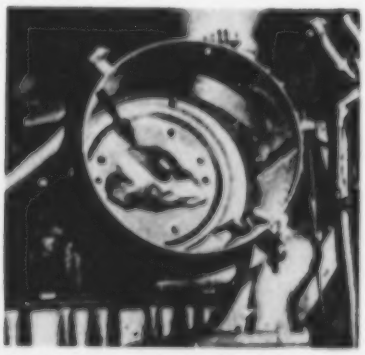
If indicator shows RED shortly after cleaning primary element and element has been cleaned 6 to 8 times, change element.

If a new primary element was used and the indicator shows RED, clean secondary element.

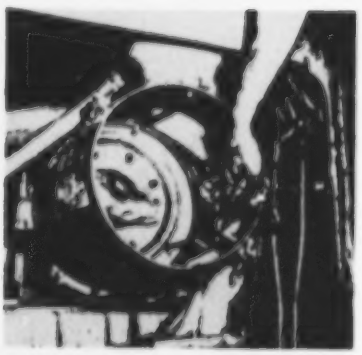
Servicing Secondary Element



1. Remove cover and primary element. Remove secondary element.



2. Cover air inlet opening.



3. Clean inside of air cleaner body.

4. Clean and inspect element Fig. 214 (3).

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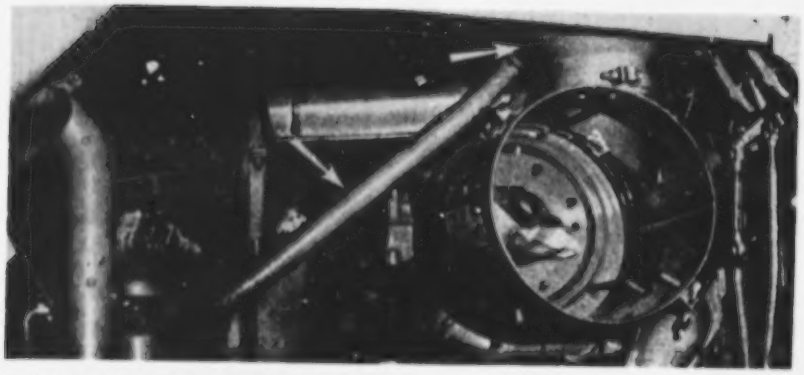
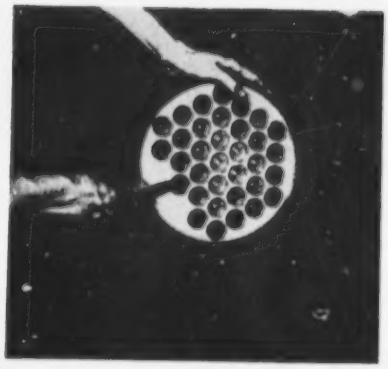
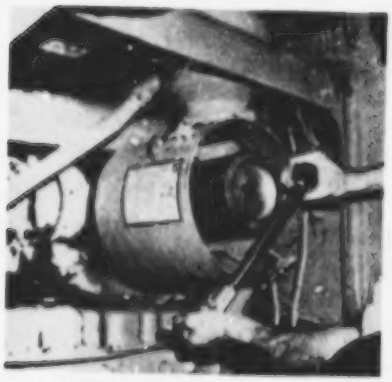
Figure 2-14. Air cleaner elements servicing (sheet 1 of 3).



5. Inspect precleaner, dust ejector and exhaust venturi. Clean all parts when necessary.

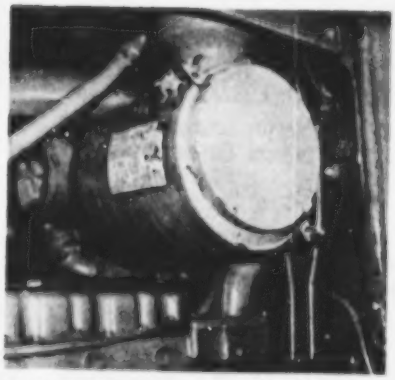


6. Clean parts with compressed air, a stiff fiber brush or wash in water and non-sudsing detergent. Dry all parts before installation.

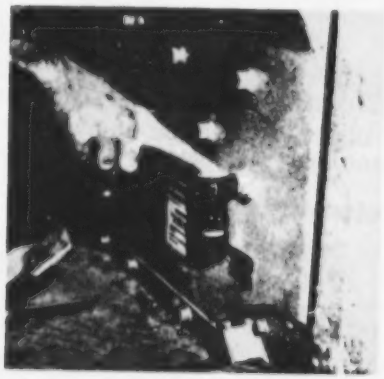


7. Uncover air inlet opening.

8. Install secondary element. Tighten nuts to 20 ± 5 lb. ft. (2.8 ± 0,7 mkg).



9. Install primary element. Install cover.



10. Reset filter indicator.

If indicator shows RED shortly after cleaning secondary element, change element.

Never use elements with damaged pleats, gaskets or seals.

Have spare elements on hand to use while cleaning and drying used elements.

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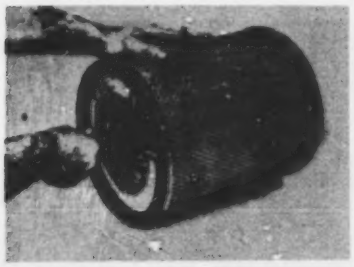
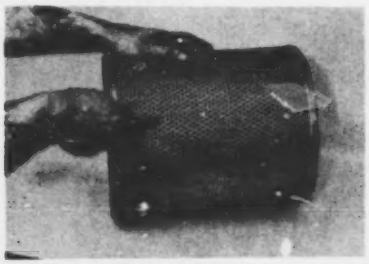
Figure 2-14. Air cleaner elements servicing (sheet 2 of 3).

Pressure Air - 100 PSI (7 kg/cm²) Maximum



1. Direct air inside element along length of pleats.



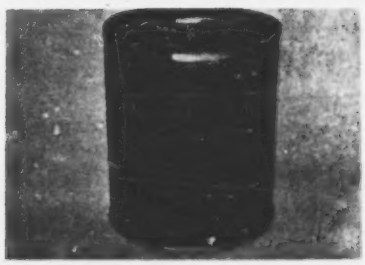
2. Direct air outside along length of pleats. Direct air inside along length of pleats.

3. Check element.

Water - 40 PSI (3 kg/cm²) Maximum

1. Direct water inside element along length of pleats.

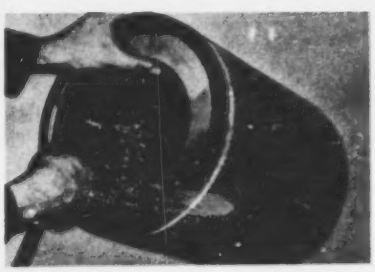
2. Direct water outside along length of pleats. Rinse element.



3. Air dry thoroughly. Check element.

Detergent

1. Wash in warm water and non-sudsing household detergent.



2. Rinse with clean water (40 psi max. 3 kg/cm²). See above.

3. Air dry thoroughly. Check element.

Checking Element

1. Insert light inside clean and dry element. Check and discard element if pinholes or tears are found.

2. Wrap and store good elements in a clean dry place.

Do not clean elements by bumping or tapping.

Have spare elements on hand to use while cleaning used elements.

Do not use elements with damaged pleats, gaskets or seals.

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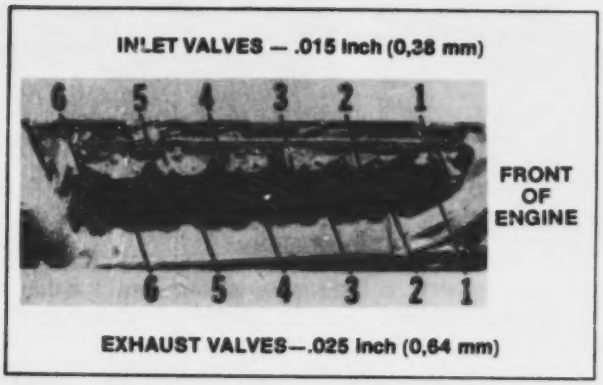
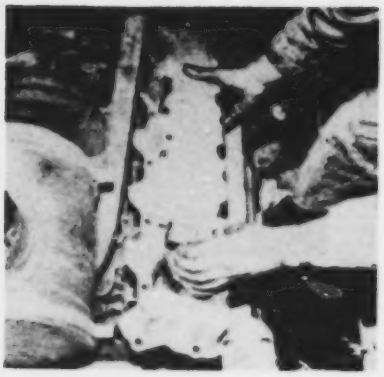
Figure 2-14. Air cleaner elements servicing (sheet 3 of 3).

2-20. Valve Clearance Adjustment

Every 2000 hours of operation or whenever the engine runs rough, adjust the valve clearance as described of figure 2-15.



Check valve lash after engine has been stopped at least 20 minutes.

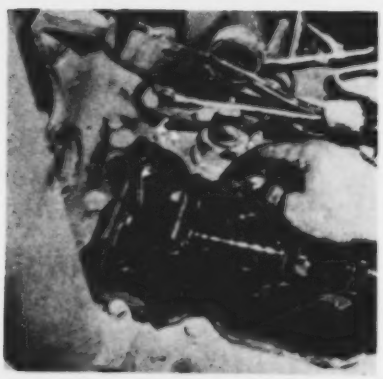


1. Remove valve cover.

2. Turn engine to close No. 1 exhaust and inlet valves.

3. Remove plug and install bolt (Part No. L2070) in flywheel. (FSN 5306-698-2150)

4. Check valve lash for No. 1, No. 3 and No. 5 exhaust valves. Adjust if necessary.

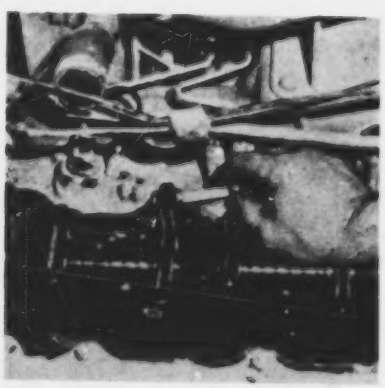


5. Check valve lash for No. 1, No. 2 and No. 4 intake valves. Adjust if necessary.

6. Remove bolt from flywheel.

7. Turn flywheel 360° to close No. 6 exhaust and intake valves.

8. Install bolt in flywheel.



9. Check valve lash for No. 2, No. 4 and No. 6 exhaust valves. Adjust if necessary.

10. Check valve lash for No. 3, No. 5 and No. 6 intake valves. Adjust if necessary.

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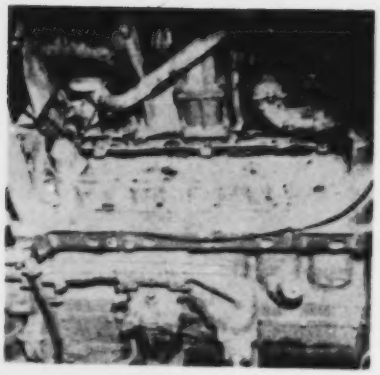
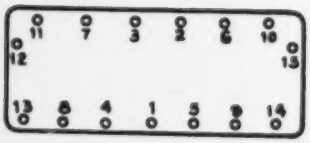
Figure 2-15. Valve clearance adjustment (sheet 1 of 2).

11. Remove bolt and install plug.

12. Start engine and operate at low idle.

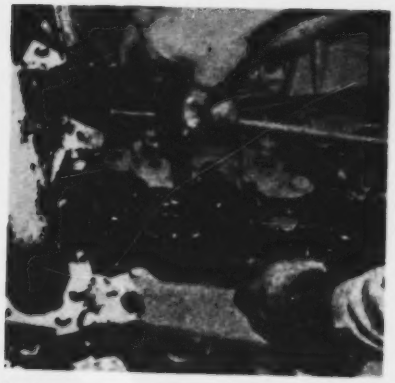
13. Check valve rotators. If valves do not rotate, report to direct support maintenance.





14. Stop engine and install valve cover. Tighten bolts to 6 to 10 lb. ft. (0,8 to 1,4 mkg) in the above sequence.

Adjusting Valve Lash



1. Loosen locknut and turn adjusting screw

2. Check adjustment.

3. Tighten locknut and recheck adjustment.

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Figure 2-15. Valve clearance adjustment (sheet 2 of 2).

2-21. Fuel Transfer Pump

a. General. The self-priming positive displacement gear-type transfer pump delivers a constant supply of fuel to the fuel filter. A spring loaded bypass valve in the filter housing maintains fuel pressure of 15 psi.

b. Removal. Refer to figure 2-16 and remove the fuel transfer pump from the engine.

c. Installation. Reverse removal procedure to install the fuel transfer pump on engine.

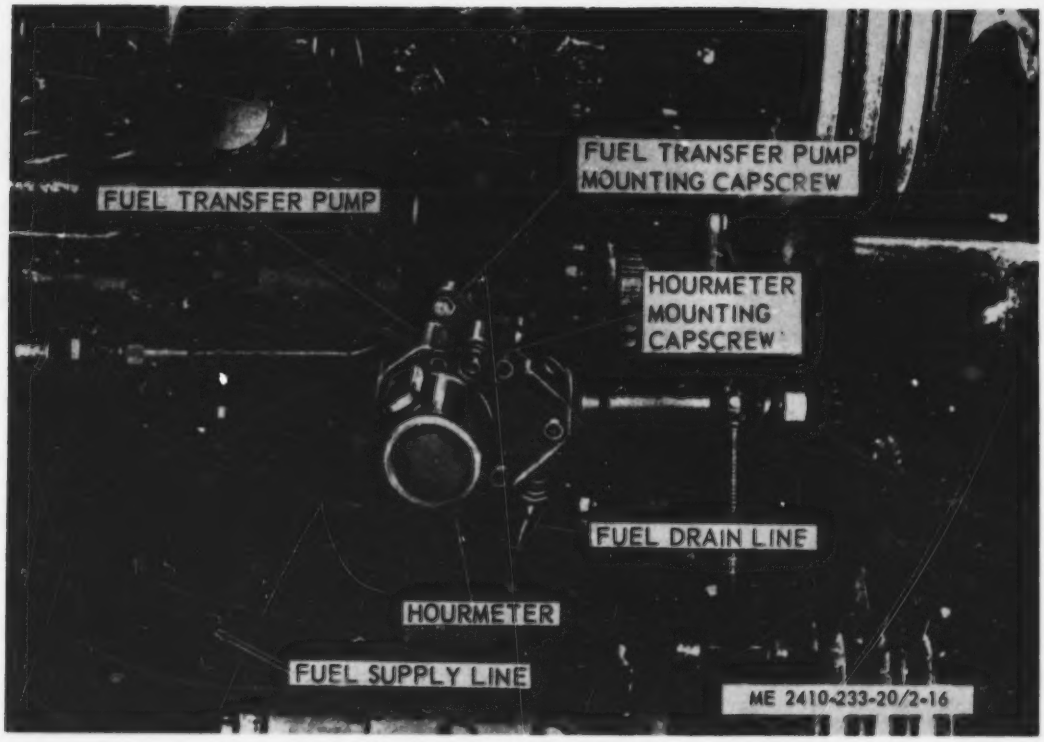

Figure 2-16. Fuel transfer pump and hourmeter.

2-22. Cooling System

Whenever the coolant temperature gages indicate overheating, the cooling system should be serviced as described on figure 2-17. If, after servicing the cooling system, the problem of overheating is not corrected, remove and inspect the thermostat as follows:

a. Drain the coolant from the engine block.

b. Loosen the clamps on the hose of the riser.

c. Remove the screws that secure the riser to the water manifold and remove the manifold. Remove the thermostat from the water manifold.

d. Test the thermostat by suspending it in a pan of heated water.

e. Check the opening temperature at which the thermostat opens. It should begin to open at 160° F and be fully open at 180° F.

f. Replace a defective thermostat and gasket.

g. Reinstall water riser and secure the hose and by-pass line with the clamps. Inspect the area of the water pump for evidence of leaking coolant. Report to direct support maintenance for maintenance of the water pump.

h. Every 1000 hours of operation, clean the sealed pressure overflow unit to remove lime deposits and other accumulations which might hold valve in open position. Disassemble the unit by removing screws that secure cover and remove cover, gaskets, and valve.

i. Inspect the valve assembly and the strainer of the sealed pressure overflow unit for damage.

j. Replace defective parts.

CAUTION

To prevent damage to the seal, do not wash the unit in cleaning solvent.

k. When reassembling overflow unit, be sure to aline holes in gasket for overflow.

l. Inspect cap assembly for any damage. Inspect gasket for damage.

m. Replace defective cap and / or gasket.

n. Inspect radiator for leaks. Report a defective radiator to direct support maintenance.

o. Inspect all water lines and fitting for leaks. Replace defective parts.

Use clean water that is low in scale forming minerals — not softened water.

Add Rust Inhibitor to coolant except when using permanent type antifreeze containing rust inhibitors.

Never add coolant to an overheated engine. Allow it to cool first.

Whenever draining and refilling the cooling system, always recheck the coolant level after the engine reaches normal operating temperature. Maintain coolant level 1/2 inch below bottom of fill pipe.

Check specific gravity of antifreeze solution frequently in cold weather to assure adequate protection.

Cleaning Cooling System

1. Run engine long enough to warm coolant. Loosen filler cap to relieve pressure.

2. Remove filler cap. Open valve and allow coolant to drain.

3. Close drain valve and fill system with cleaning solution.[1]

4. Start engine and operate for 1/2 hour.

5. Stop engine and open valve. Flush system with clean water until draining water is clear.

6. Close drain valve and fill system with neutralizing solution.[2]

7. Start engine and operate for 10 minutes.

8. Stop engine, open drain valve and flush system.

9. Close drain valve and add coolant to proper level.

[1] 2 lb. Sodium Bisulphate (NaHSO4) per 10 gal. water (mix 25 grams per 1 liter of water).

[2] 1/2 lb. Sodium Carbonate Crystals (Na_2CO_3, 10 H_2O) per 10 gal. water (mix 6 grams per 1 liter of water).

Note
Most commercial cooling system cleaners may be used.

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Figure 2-17. Cooling system servicing.

2-23. Fan Assembly

a. Inspect. Fan assembly should be inspected every month for a loose or damaged condition. Replace a damaged fan assembly.

NOTE

No special tool is required to adjust fan blades.

b. Adjustment. To adjust air flow of fan each fan blade must be adjusted individually. Force the fan blade inward (against spring pressure) toward hub to disengage the tongue on the thrust washer from the locking slot in hub. Then turn the fan blade until the tongue of the thrust washer locks in place in the alternate position. See figure 2-18.

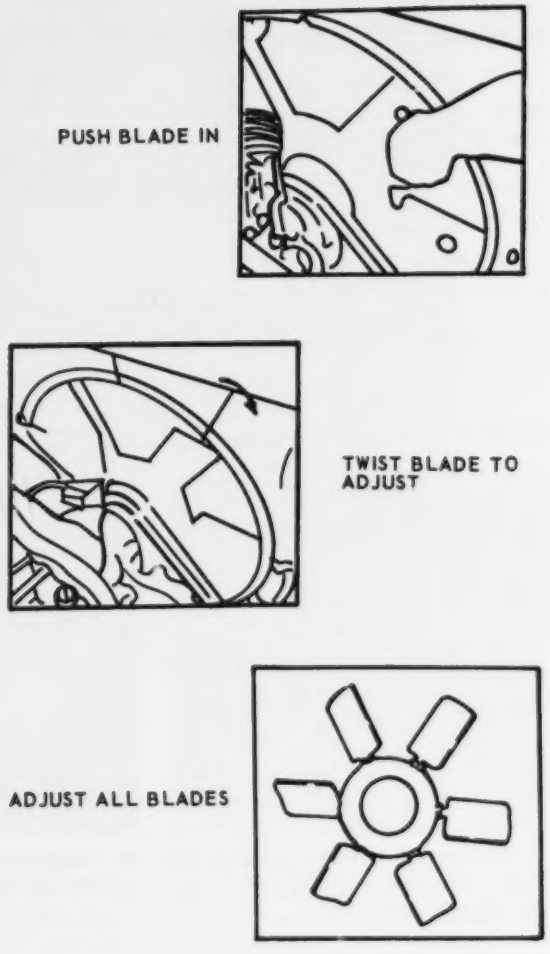


Figure 2-18. Fan blade adjustment.

2-24. Fan Belts

a. Removal.

(1) Remove engine upper guard assemblies.

(2) Loosen fan belts (fig. 2-19).

(3) Slip forward belt off the generator and crankshaft pulleys. Pass belt over fan blade in expanded portion of fan guard. See figure 2-20.

(4) Rotate fan assembly by hand and slip belt around each blade as it enters expanded cage. When fan has been rotated approximately ¼ of a revolution the belt should drop between the fan

blade assembly and the radiator core. The belt may be withdrawn by passing below the lowest fan blade.

(5) Repeat procedure with other two belts.

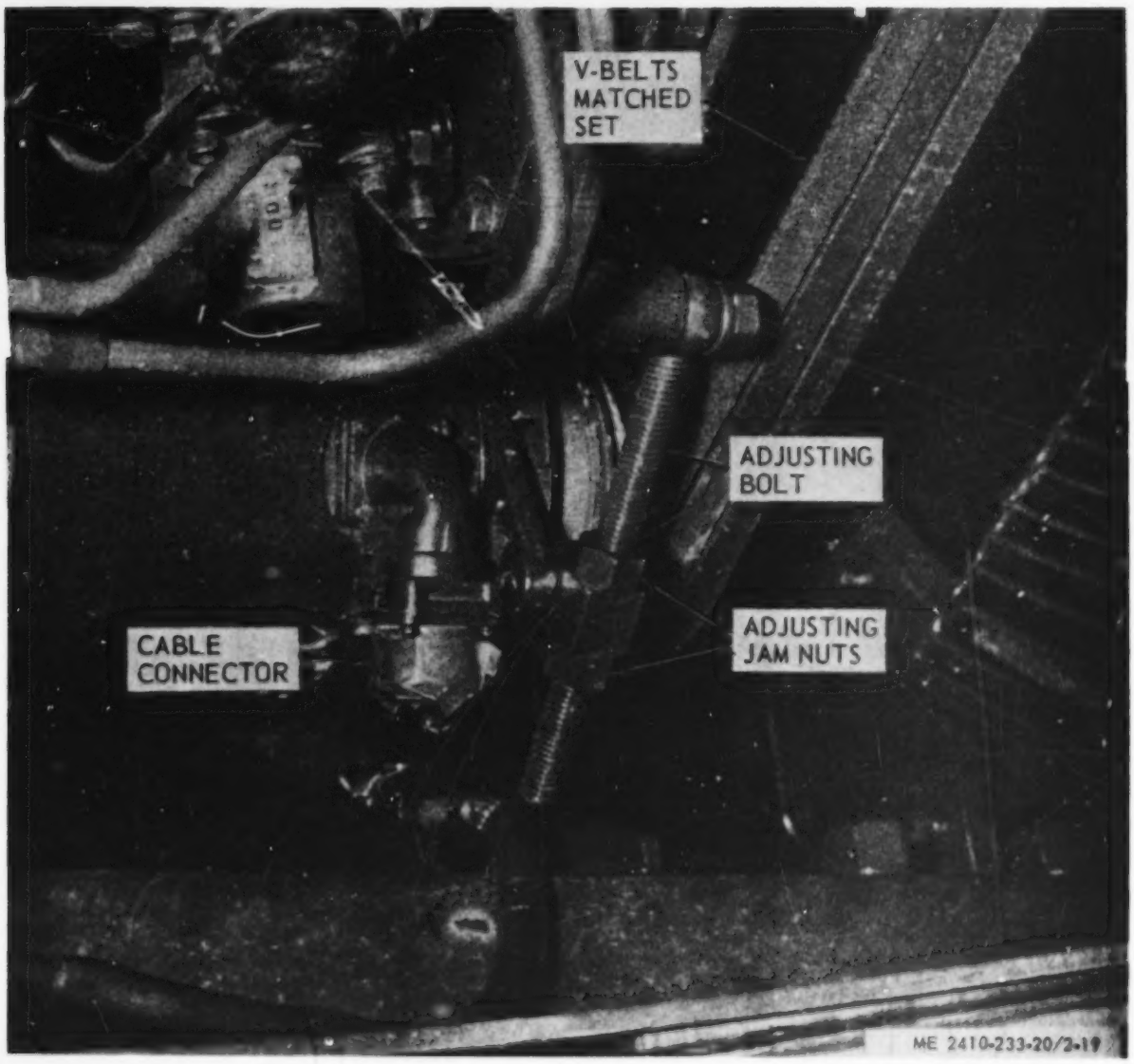


Figure 2-19. Fan drive belt adjustment.

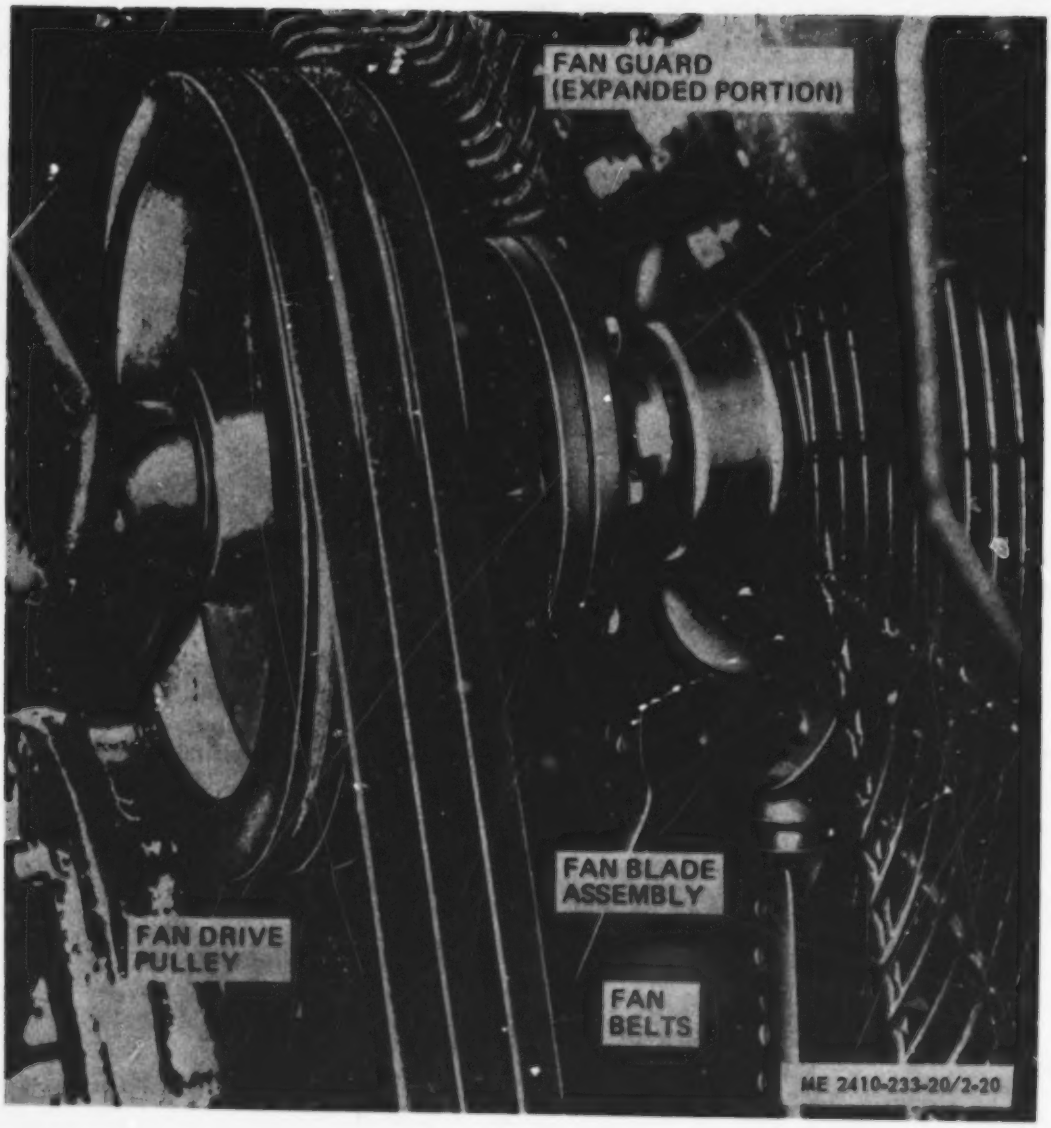


Figure 2-20. Fan belts.

b. Installation.

NOTE

Fan belts must be replaced as a set.

(1) Place belt over a fan blade within the expanded portion of the fan guard.

(2) Rotate fan assembly by hand and slip belt around each fan blade as it enters expanded cage. When fan belt drops to pulley spindle, repeat procedure with other two belts.

c. Adjustment. With belts on appropriate pulleys, adjust belt tension (fig. 2-19). Check the belts for 7/8-inch deflection at 25 lbs pressure midway the pulleys. Initial installation for new belts is ¾-inch deflection.

2-25. Governor Control and Throttle Linkage Adjustment

All adjustments should be made when governor control shaft is in shutoff position. Disconnect all linkage and turn lever clockwise to force governor control shaft to shutoff position. Engage the nearest

serration tooth to obtain lever positions closest to approximate angles indicated in figure 2-21.

a. Deceleration Control Adjustment. With proper adjustment the dashpot (1) retards the motion of the governor shaft and control lever which is used to reduce the possibility of the engine stalling on rapid deceleration.

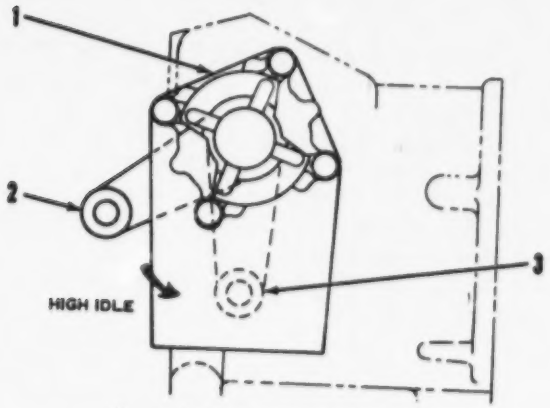
(1) Position governor shaft and control lever (2) in high-idle position as shown at (3). The lever is keyed to the shaft so lever to shaft relationship is non-adjustable.

(2) Install coupling assembly so pin engages slots in lever (2).

(3) With the governor control lever held in high-idle position, engage dashpot and coupling serrations.

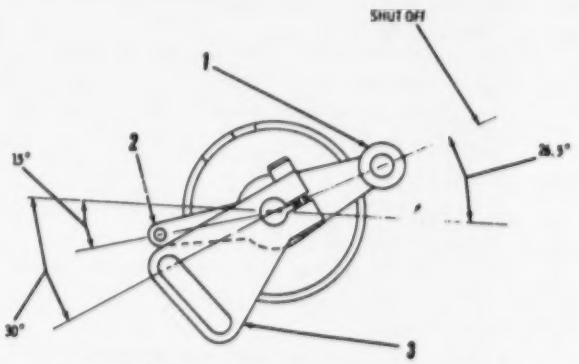
(4) Rotate dashpot clockwise to limit of dashpot shaft travel.

(5) Align dashpot mounting holes and secure with capscrews.



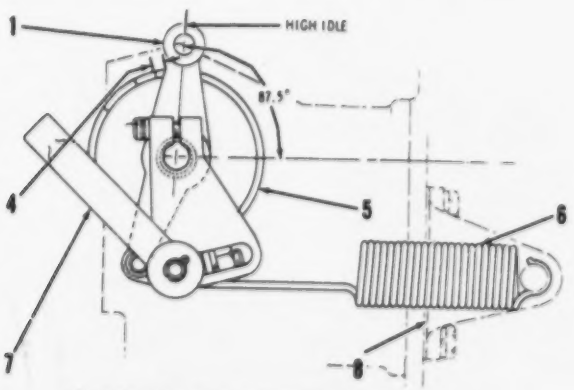
A. DASHPOT INSTALLATION

1–Dashpot. 2–Governor control lever. 3–High idle speed position.



B. GOVERNOR AND DECELERATOR LEVERS INSTALLATION

1–Governor control lever. 2–Decelerator control spring lever. 3–Decelerator cable control lever.



C. DECELERATOR LINKAGE ADJUSTMENT

1–Governor control lever high idle position. 4–Stop clearance .12 in. (3,05 mm). 5–Clamp. 6–Decelerator control spring. 7–Decelerator cable yoke end. 8–Bracket.

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Figure 2-21. Governor and throttle linkage adjustment.

b. Governor and Declerator Levers Installation.

(1) Install lever (1) at 26.3° from horizontal as shown.

(2) Install spring lever (2) at 15° angle from horizontal.

(3) Install lever (3) with rear of its slot at 30° angle from horizontal as shown.

(4) Force lever (3) on the shaft to remove clearance between the levers and tighten the clamp bolt.

(5) Move the governor control shaft to high-idle position. This will be when lever (1) makes an angle of 87.5° from horizontal as shown.

c. Declerator Linkage Adjustment.

(1) Move clamp (5) so there is 0.12 in (3.05 mm) clearance at gap (4) between lever (1) and the stop on the clamp.

(2) Adjust yoke end (7) so connecting pin will be at rear of slot in lever (3).

(3) Attach decleration control spring (6) to lever (2) and bracket (8).

2-26. Hourmeter

a. Inspect. Inspect hourmeter for loose mounting or broken lens.

b. Removal. Remove capscrews holding hourmeter to fuel transfer pump. (fig. 2-16). Remove hourmeter.

c. Installation. Reverse removal procedure and install the hourmeter.

2-27. Governor

a. Adjustment.

(1) Refer to para 2-26 (fig. 2-16) and remove the hourmeter.

(2) Install tachometer drive adapter (caterpillar Part No. 2N6741) on the fuel pump.

(3) Reinstall hourmeter and secure with capscrews.

(4) Attach standard drive tachometer to adapter and check engine speed with the governor set in low-idle r.p.m. position. Tachometer indication should be 650 r.p.m.

(5) To adjust r.p.m., remove governor cover, figure 2-22. Turn low-idle adjusting screw counterclockwise or clockwise as required to correct low-idle speed.

(6) Check engine speed with governor set in the high idle r.p.m. position. Tachometer indication should be 2000 r.p.m.

(7) Turn high-idle adjusting screw as necessary to correct high-idle speed.

(8) Place governor control lever in an intermediate setting r.p.m., then check low-idle and high idle setting. Readjust if necessary.

b. Installation. Remove tachometer drive and reinstall hourmeter.

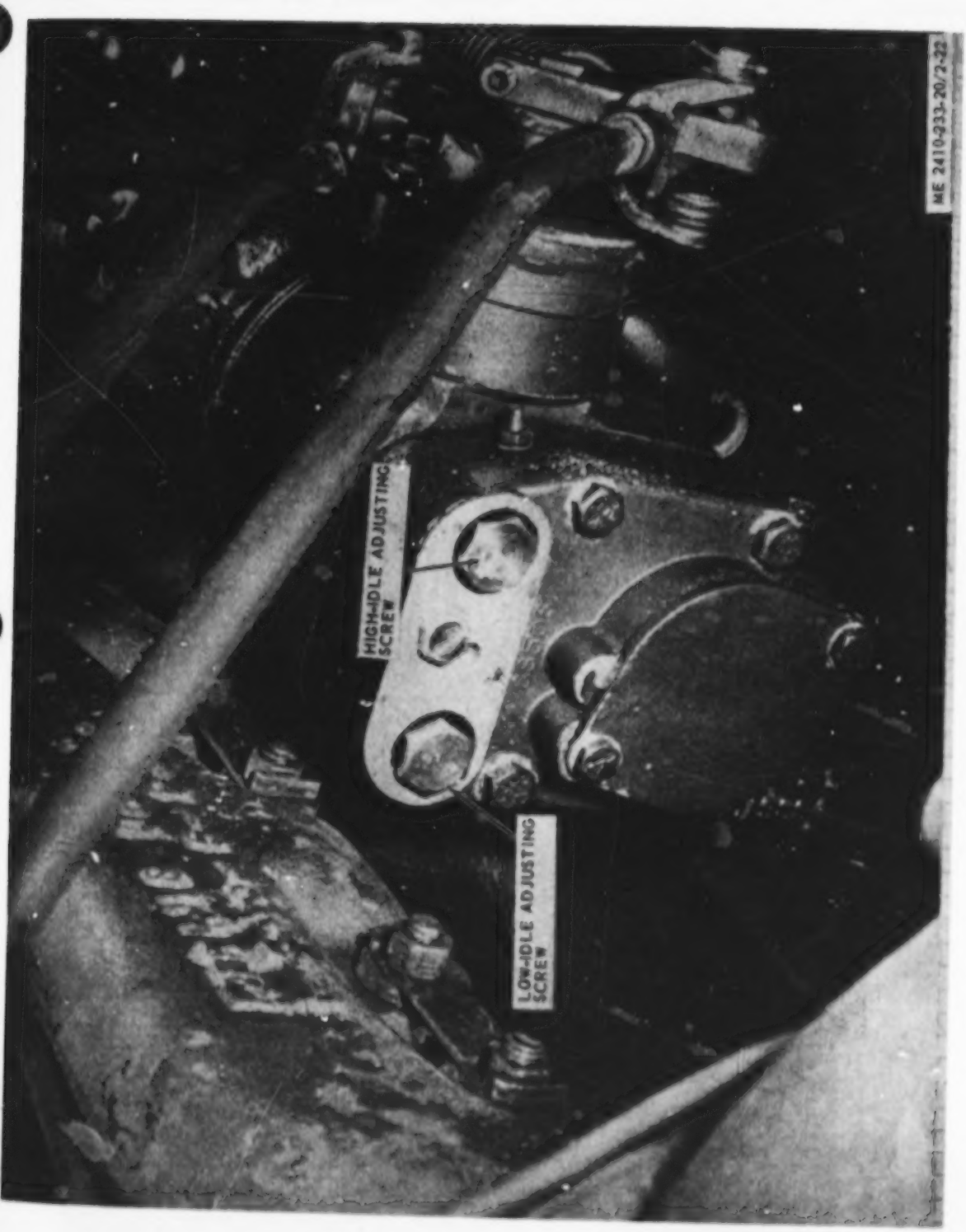


Figure 2-22. Engine speed governor.

2-28. Muffler

a. Removal

(1) Remove the hood.

(2) Remove 2 bolts (fig. 2-23) and remove exhaust tube assembly from muffler.

(3) Remove 4 nuts and bolts securing muffler straps and remove the top half of the straps from muffler.

(4) Slide muffler with coupling from turbocharger housing and remove muffler from engine.

b. Inspection. Inspect muffler for cracks, dents, corrosion, broken welds, or ruptures. Replace a defective muffler.

c. Installation. Reverse removal procedure and install the muffler on the tractor.

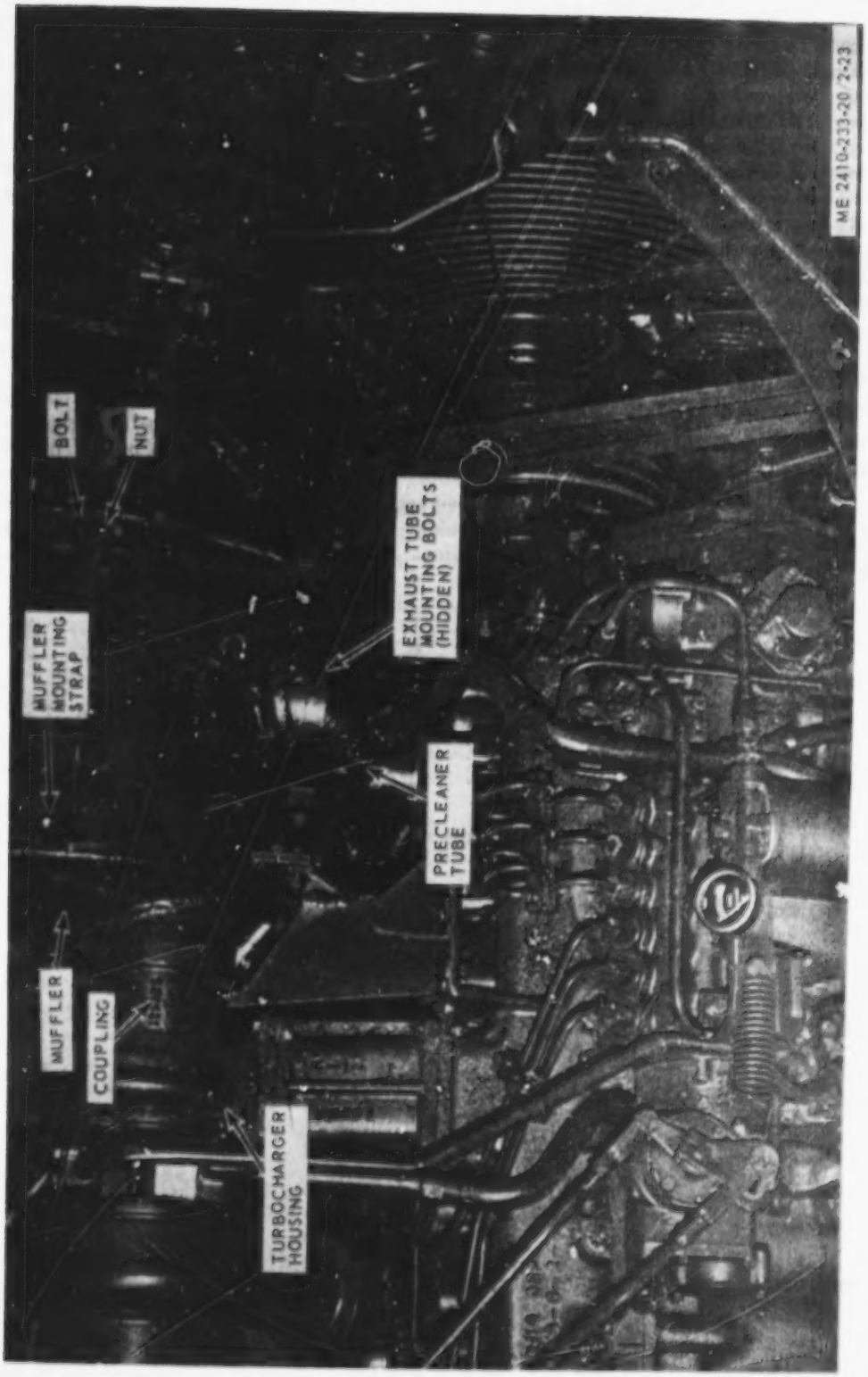


Figure 2-23. Muffler.

Section IX. MAINTENANCE OF ELECTRICAL SYSTEM

2-29. General

The tractor electrical system is a 24-volt system composed of a 40-ampere generator and generator regulator or a 50-ampere alternator with integral regulator, a starter, two 12-volt batteries, lights, switches, circuit breakers, instruments, and wiring harness. The two 12-volt batteries are connected in series to provide 24-volt power for the starter. A slave receptacle is provided on the dash for booster power when the batteries are in discharged condition. Figure 1-1 is the wiring diagram for the electrical system. All removals and installations of the electrical components will be performed with the disconnect switch in OFF position.

2-30. Generator Replacement

a. Disconnect the generator-to-regulator cable at the quick disconnect switch.

b. Loosen the upper jam nut on the adjusting bolt (fig. 2-19), and remove capscrew securing adjusting bolt to bracket.

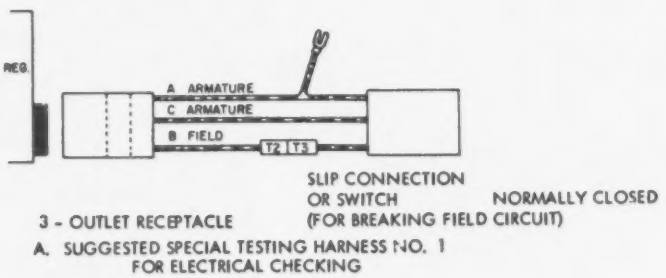
c. Remove nut from generator mounting bolt and remove bolt. Remove generator from tractor.

NOTE

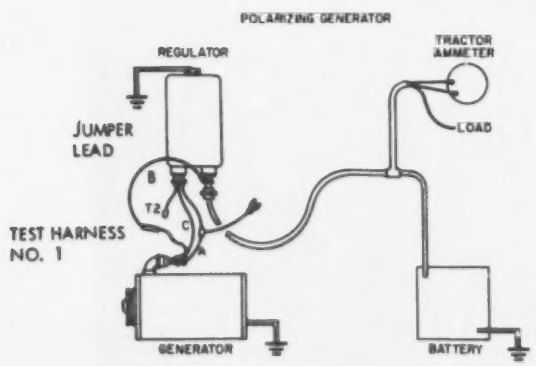
When replacement generator is not available, convert electrical supply to alternator as described in paragraph 2-31.

d. Install replacement generator in reverse order of removal. Tighten belt tension as described in paragraph 2-24.

e. Polarize the generator. To polarize the generator use the special testing harness no. 1 (fig. 2-24) inserted in generator circuit, T2 and T3 disconnected making an open field circuit and with the battery cable disconnected from the regulator momentarily touch a jumper lead between the T-3 of harness No. 1 and the prong of the battery cable. This allows a surge of current to flow through the generator field windings in the proper direction. Failure to do this may result in severe damage since reversed generator polarity causes vibration, heavy arcing, or welding of the cutout relay contact points.



A. SUGGESTED SPECIAL TESTING HARNESS NO. 1 FOR ELECTRICAL CHECKING



B. WIRING CONNECTIONS FOR POLARIZING GENERATOR

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Figure 2-24. Polarizing generator.

2-31. Alternator for Generator Replacement

a. Removal.

(1) Disconnect wiring harness from generator.

(2) Loosen belt tightener and remove belts.

(3) Remove belt tightener, generator, and bracket.

(4) Remove all bolts holding wiring harness to the engine.

(5) Disconnect wiring harness and ground jumper wire to voltage regulator.

(6) Remove the wiring harness.

(7) Remove regulator and bracket.

(8) Remove all bolts holding ground jumper wire.

(9) Disconnect wire from ammeter and remove wire.

b. Installation.

(1) Install the pulley on the alternator (fig. 2-25).

(2) Tighten the nut to 75±5 lb. ft. torque.

(3) Install bracket (1), alternator (2), and belt tightener (3).

(4) Install ground connector (4) to the alternator and to a good connection on the engine.

(5) Install belts.

(6) Install wire (5) to the alternator.

(7) Route wire from alternator to circuit breaker bracket and secure with clamps.

(8) Install bracket.

(9) Install instruction plate (6) and circuit breaker (7) to bracket (8).

(10) Install grommet, clip, and diode (9).

(11) Install wires (10) and (11).

(12) Connect wire (5) to circuit breaker (7) as shown (minus(—)) connection.

(13) Connect a wire from plus (+) connection on circuit breaker (7) to ammeter.

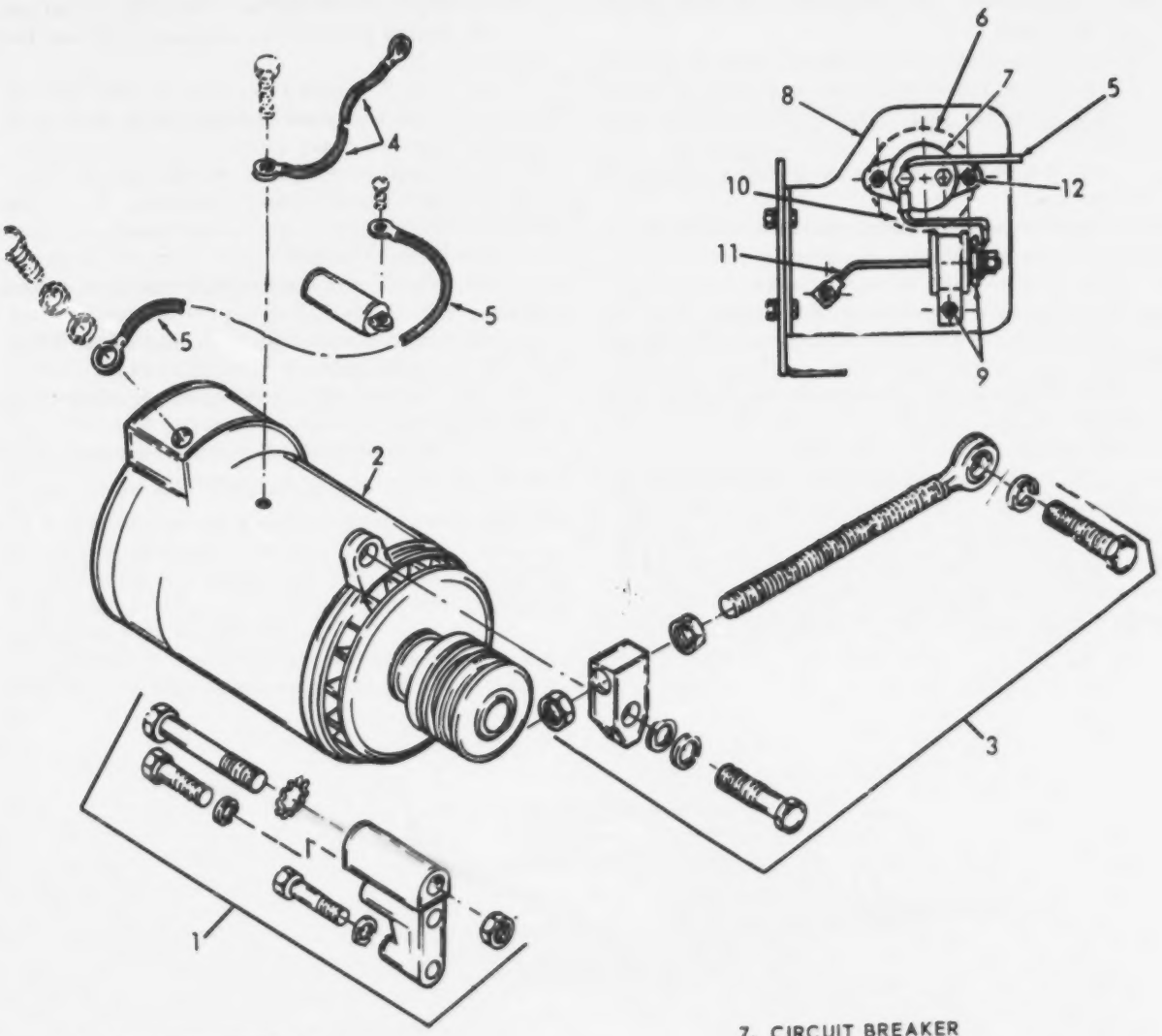


Figure 2-23. Alternator.

2-32. Starting Motor Replacement

CAUTION

Disconnect battery ground cable.

a. *Removal.*

(1) Remove right engine compartment access door.

(2) Disconnect and tag all starter motor cables.

(3) Remove 4 bolts and remove center plate assembly between crankcase and transmission guards.

(4) Support front guard assembly with hydraulic jack, crane, or walk-along etc. and remove the 7 guard mounting bolts.

(5) Lower guard supporting device and allow guard to swing slowly to ground on right hinge.

(6) Remove the capscrews that secure starter to flywheel housing and lower starter through bottom of engine compartment.

b. Installation. Installation of starter motor is reverse procedure of removal.

2-33. Cables

a. Disconnect suspected defective cables.

b. When replacing battery-to-starter cable; bolt and / or tape end of replacement cable to old cable; loosen or remove cable clamps; and pull replacement cable thru using old cable to pull replacement cable thru clamp and brackets.

c. Apply light coat of GAA to terminals before installing cable thru ends. Use internal / external tooth washers to lock cable ends in place on studs.

2-34. Batteries

a. Testing. The batteries should be tested with a hydrometer to maintain a specific gravity of 1.250 or above. Always test the battery before adding water. A difference of 0.025 is allowable between cells. A reading of 1.150 or less will permit the battery to freeze at a few degrees below the freezing point of water. A specific gravity of 1.250 will permit the battery to withstand temperatures as low as —60 F. without freezing. Always charge the battery by running the engine twenty minutes or longer after adding water to the battery.

b. Charging. The generator charging rate is correct when it maintains the battery at a minimum specific gravity of 1.250 and does not require the addition of more than 1 ounce of water per cell per week or 50 service hours, except in hot weather. TM 9-6140-200-15 contains instructions for maintenance of the batteries.

c. Removal and Installation (Fig. 2-26).

(1) Disconnect and remove cables from batteries.

(2) Loosen wingnuts and move battery holddown bolts to side.

(3) Remove battery holddown.

(4) Using battery handles, lift and remove batteries from battery box.

(5) Install replacement batteries and secure with holddown.

(6) The battery cables should have battery labels attached before reinstallation as follows:

(a) Battery Cable label (negative) FSN 7690-477-3715.

(b) Battery cable label (positive FSN 7690-477-3714. Use supporting line straps, FSN 5340-985-6630, to secure labels to cable.

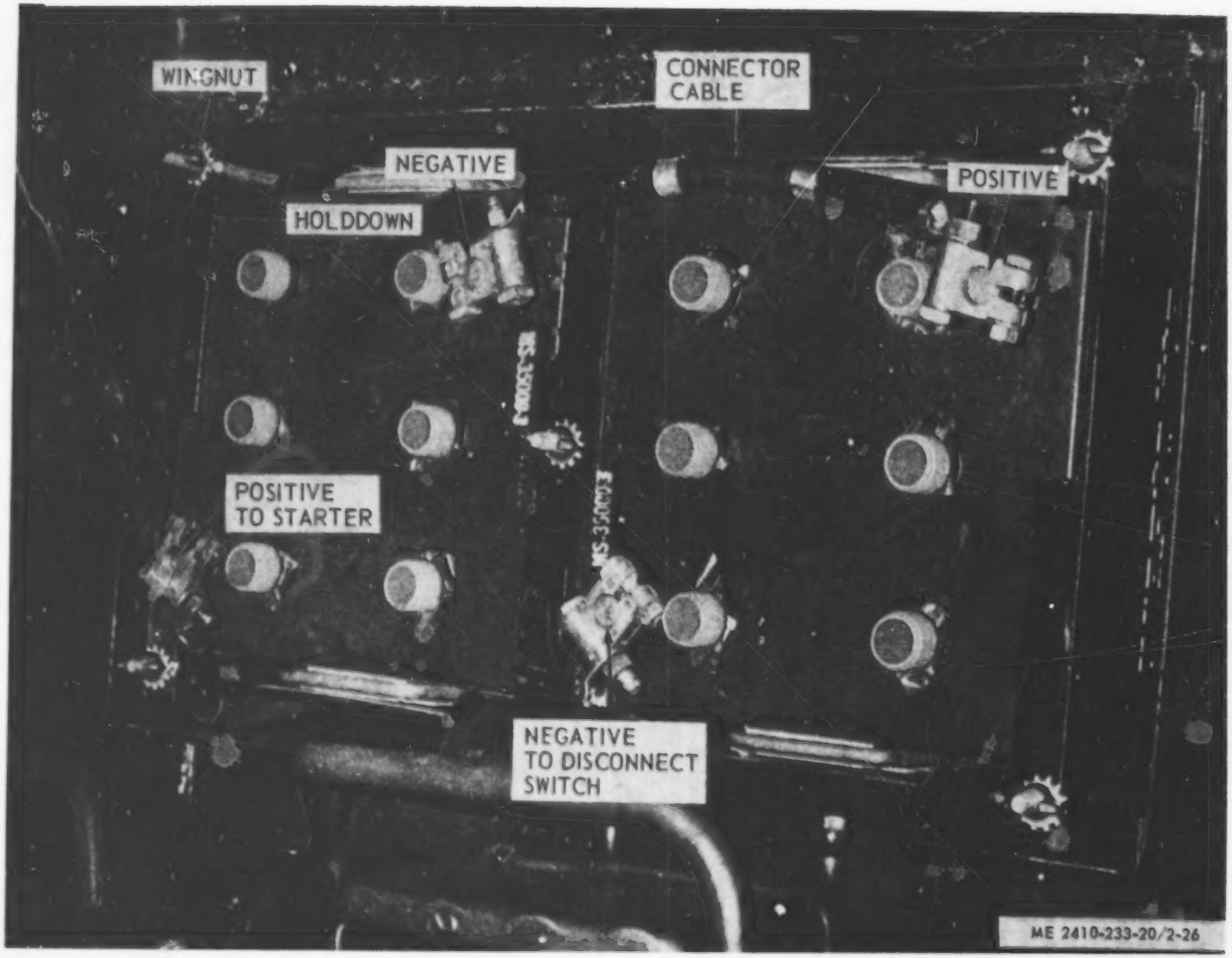


Figure 2-26. Battery box and batteries.

2-35. Headlights and Floodlights

a. Lamp Replacement.

(1) Loosen screws in lamp retaining rings and remove lamp and rubber ring from housing.

(2) Disconnect wiring at back of lamp by separating plug from socket.

(3) Remove rubber ring from lamp.

(4) Install replacement lamp by reversing steps (1) thru (3).

b. Lighting Unit Replacement.

(1) Disconnect electrical lead at back of lamp.

(2) Remove nut, spacer, lockwasher, and flatwasher from lamp shaft and remove lamp from bracket.

(3) Install replacement lamp in reverse of removal.

(4) Adjust lamp beam for proper illumination before tightening nut on shaft.

2-36. Gages, Wiring and Switches

a. Remove capscrews that secure cover to top of dash assembly and remove cover.

b. Remove attaching hardware and remove defective component from dash. It may be necessary to remove screws that secure instrument panel to dash and remove panel in order to gain access to lower items on panel.

c. Install replacement component in reverse of removal. Check operation of component before reinstalling panel and cover.

2-37. Disconnect Switch

a. Testing

(1) Disconnect cable from battery to disconnect switch.

(2) With switch in the ON position check for continuity. Replace switch if it is found to be defective.

b. Removal.

(1) Pull handle on front of driver's seat and tilt seat forward.

(2) Tag and disconnect the two cables attached to the back of disconnect switch. Remove cables.

(3) Remove control handle from switch.

(4) Remove hex nut holding disconnect switch to driver's seat support.

c. Installation. Installation of disconnect switch is reverse procedure of removal.

2-38. Glow Plugs

a. Removal. Turn disconnect switch to the OFF position. Tag and disconnect electrical leads. Remove glow plugs from the precombustion chamber (fig. 2-27).

b. Inspection. Inspect glow plug for any visible damage. Tip of glow plug, that is inserted in the precombustion chamber, will overheat and split if switch is left turned on for too long a time. Replace damaged plugs.

c. Installation. Installation is in the reverse of removal. Tighten glow plugs to 120±24 lb. in.

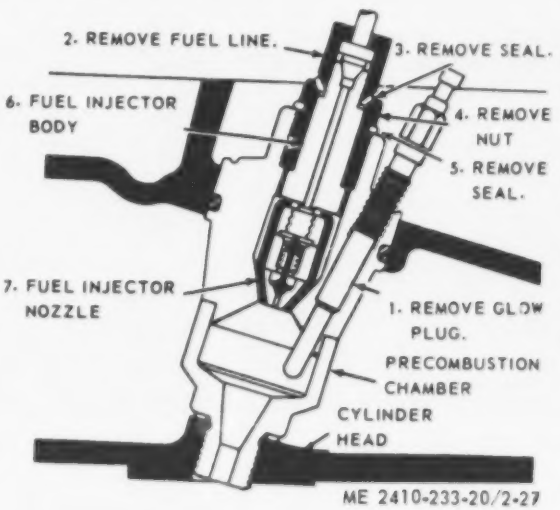


Figure 2-27. Glow plug removal.

2-39. Lines and Fittings

a. Inspect. Fuel lines and fittings for leaks. Tighten lines. If leak continues replace lines.

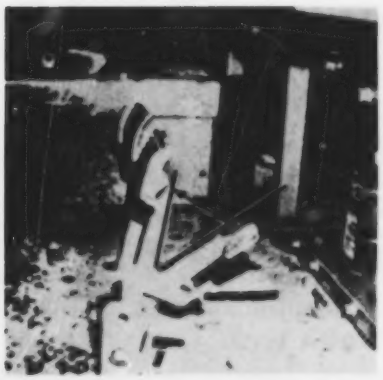
b. Removal. Disconnect defective fuel injection line slowly at fuel injection pump so as to relieve pressure on line. Line may now be disconnected at fuel injection pump and at fuel injector.

c. Installation. Installation of new lines is the reverse of removal.

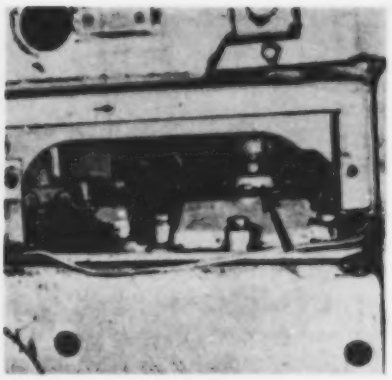
Section X. MAINTENANCE OF DRIVE COMPONENTS

2-40. Steering Clutch Brake Adjustment

The steering clutch brakes should be adjusted every 250 hours of operation as described on figure 2-28. When adjusting the linkages, make sure that the brake lock will properly engage the ratchets in order to lock the clutches in neutral position.

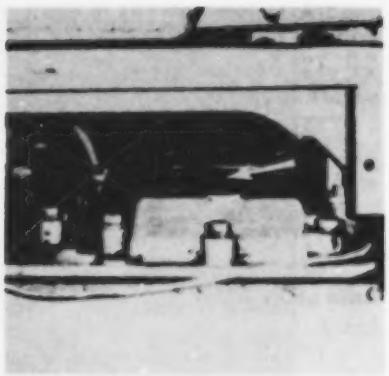


Check adjustment. Adjust brakes **when** pedal travel reaches 6 to **6-1/4** inches (0,15 m to 0,16 m).



To Adjust:

1. Remove guard and cover.



2. Turn adjusting socket in until tight. Back socket out 1-1/2 turns (9 clicks).

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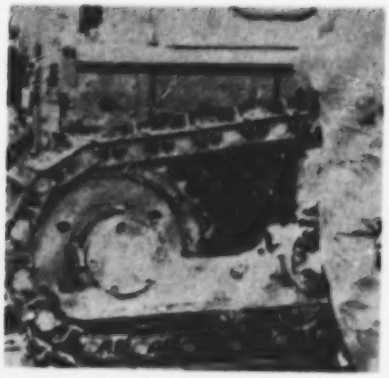
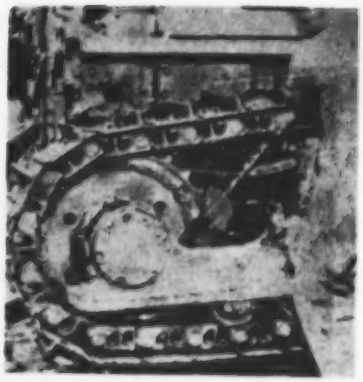
Figure 2-28. Steering clutch brake adjustment.

2-41. Sprocket Hub Bearings

On new or reconditioned tractors, the sprocket hub bearings should be adjusted after the first 125 hours and 250 hours of operation; then every 1000 hours as described on figure 2-29.

1. Remove guards.

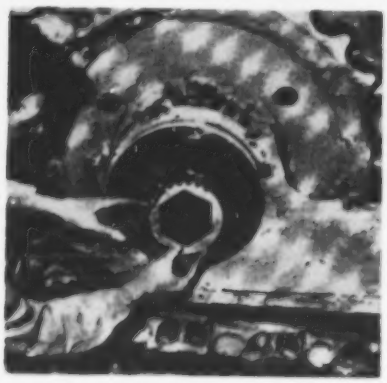




2. Place a 5 foot (1,5 m) bar between the track roller frame and the sprocket. Pry on bar. If side movement is noticeable, adjust bearings.

To Adjust:

1. Remove lock.



2. Remove cap and lock.

3. Loosen adjusting nut. (Turn clockwise).

4. Tighten retaining nut to 1100-1200 lb. ft. (150-165 mkg). Install lock and cap.

5. Tighten adjusting nut. (Turn counterclockwise). Use a 5 foot (1,5 m) extension or wrench.

6. Install lock.

7. Recheck adjustment.

8. Install all guards.

NOTE:
Adjust both bearings in similar manner.

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Figure 2-29. Sprocket hub bearing adjustment.

2-42. Track Frame Roller Guard

a. Inspection. Inspect guard for a dented or otherwise damaged condition.

b. Replacement. Replace track from roller guard if it is found to be defective (fig. 2-30).

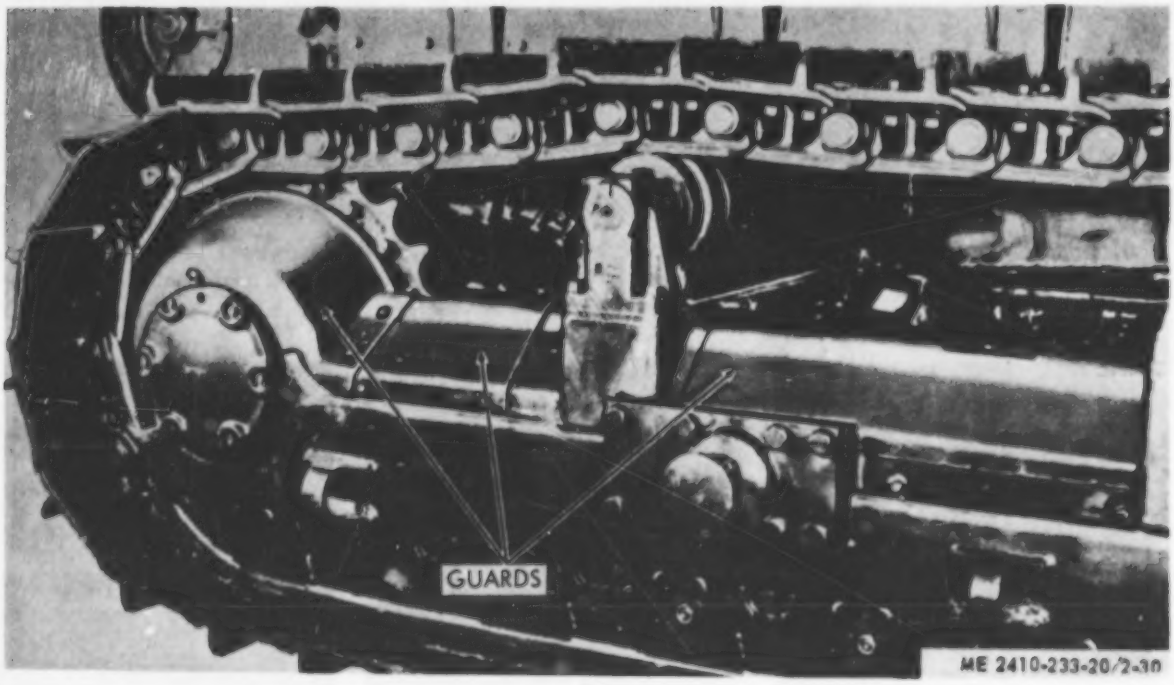


Figure 2-30. Track frame roller guard.

2-43. Torque Divider Scavenger Pump

a. Replacement.

(1) Drain the oil from transmission and torque converter (para 2-5).

(2) Remove retaining bolts (fig. 2-31) holding scavenge pump to torque converter housing.

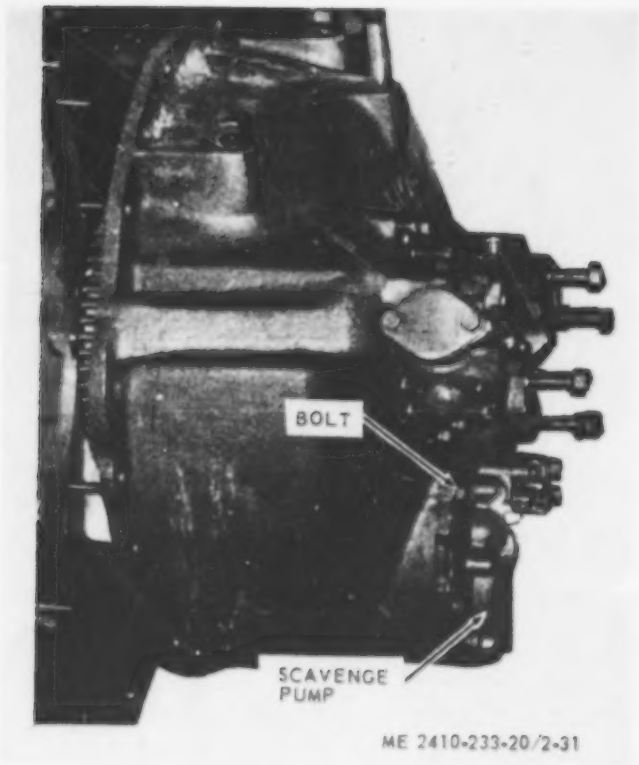


Figure 2-31. Torque divider scavenge pump.

b. Installation. Installation is reverse of removal. Fill transmission oil sump to FULL mark on dipstick and start engine. Recheck oil level and fill to FULL mark.

2-44. Track Shoe Replacement

Track shoes should be replaced when they are worn to a point where little or no traction is afforded or when they are broken. Replace shoes by removing attaching hardware and install replacement shoes.

2-45. Transmission Oil Cooler

a. Removal.

(1) Drain the engine cooling system and the oil from the oil cooler (fig. 2-32).

(2) Remove capscrews that secure oil line flanges to cooler and separate flanges from cooler.

(3) Remove capscrews that secure cooler to stabilize bracket at bottom of cooler and the water manifold.

(4) Remove cooler.

(5) Remove bottom bonnet and gasket from cooler.

b. Cleaning. Accumulations of sediment can be dislodged from inside the tubes in the core by pushing a rod (with a diameter slightly less than the inside diameter of the tubes) through each tube. Flush the loosened sediment from the core. The inside of the cooler may be cleaned by boiling the core in extremely hot water to loosen and remove sediment inside the cooler. Flush the core with cleaning solvent and blow out with compressed air. Check for leaks when air pressure is applied to core.

c. Installation. Using new gaskets, reverse removal procedure. Tighten capscrews to 75 ± 10 ft.-lbs. torque. Fill cooling system. Start engine, bring to operating temperature, and check for leaks. Fill transmission to FULL mark on dipstick.

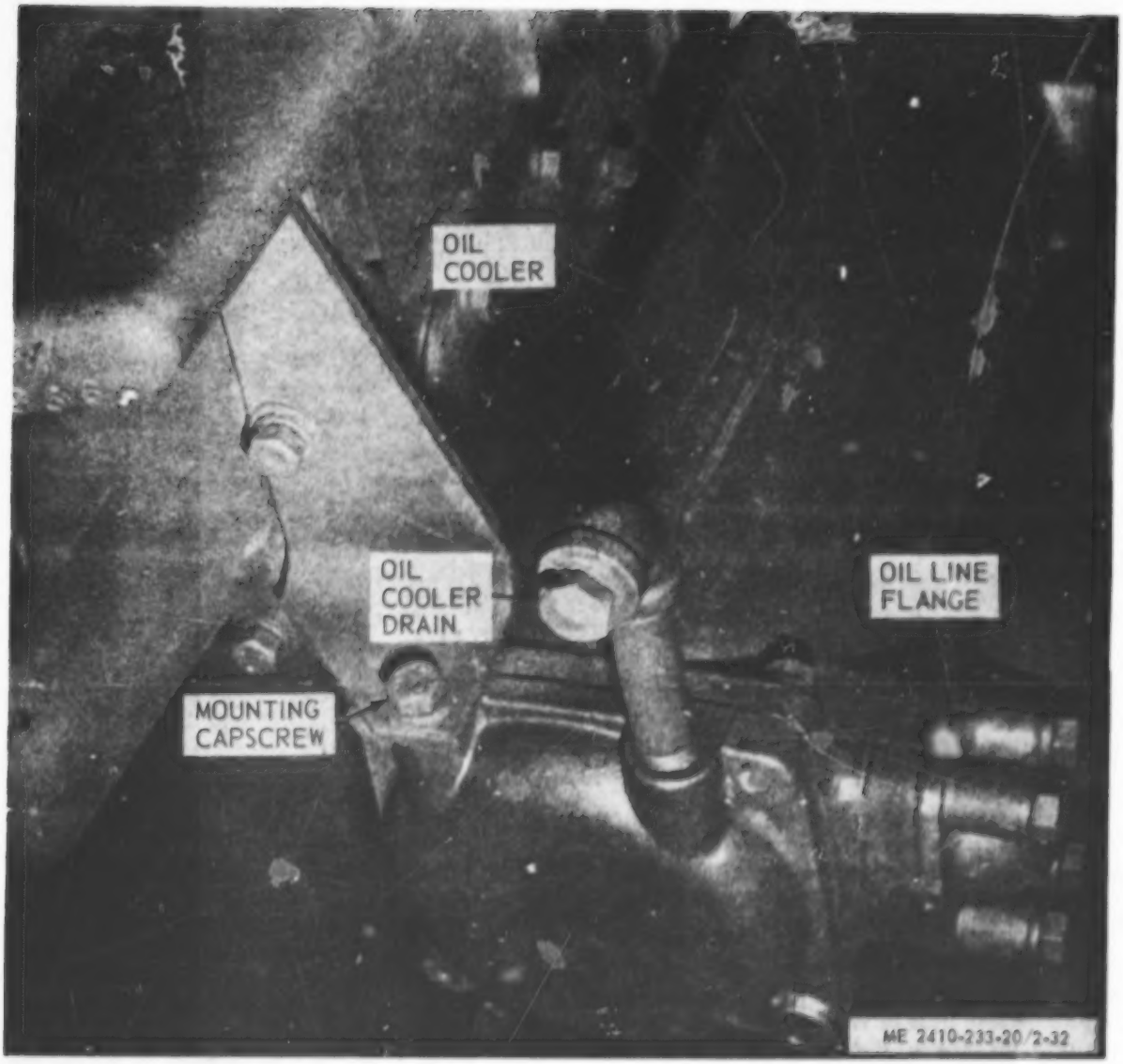


Figure 2-32. Transmission oil cooler.

2-46. Transmission and Steering Clutch Hydraulic Pump

a. Removal.

(1) Remove tool box and bracket and side shield from right side of engine.

(2) Remove capscrews and disconnect suction and pressure oil lines from pump (fig. 2-33).

(3) Remove capscrews that secure pump to flywheel housing and remove pump.

(4) Cover ends of oil lines to prevent entry of dirt or foreign material.

b. Installation.

(1) Fill replacement pump with clean oil and rotate drive gear to place a film of oil on the pump gears and body and to aid in priming the pump.

(2) Install new O-rings on the hydraulic line flanges if required.

(3) Install the pump in reverse order of removal.

(4) Start engine and check for operation of transmission and steering clutches.

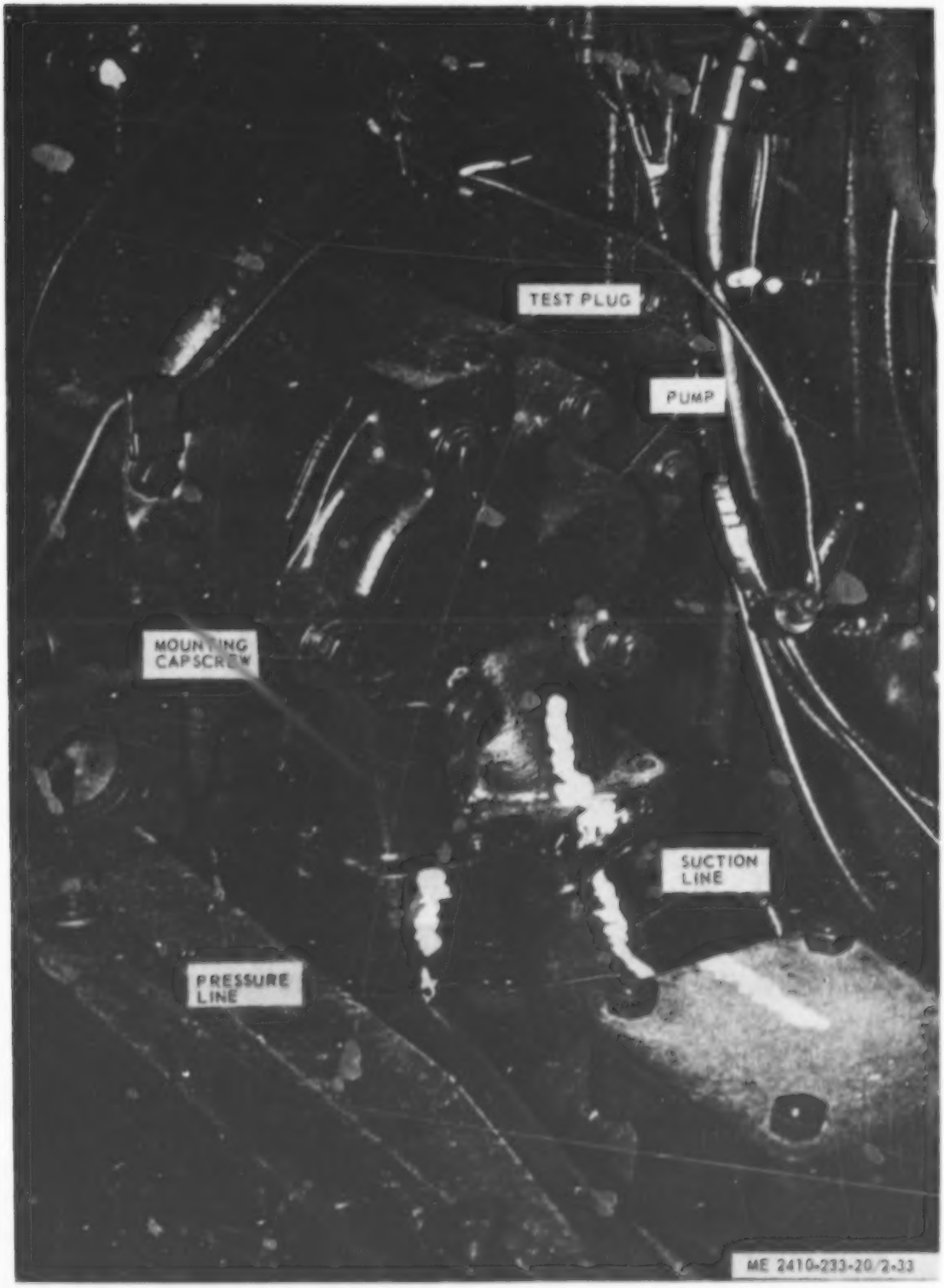


Figure 2-33. Transmission and steering clutch pump.

Section XI. MAINTENANCE OF TRACTOR HYDRAULIC SYSTEM

2-47. Dozer and Winch Hydraulic Pumps (Fig. 2-34)

CAUTION

If tractor is to be operated while pump is removed, a cover plate must be installed on accessory drive housing to prevent loss of oil and to prevent entry of dirt or foreign matter.

a. Removal.

(1) Drain hydraulic tank.

(2) Remove floor boards covering pumps and lines.

(3) Clean pump, lines, and areas where pump is mounted to flywheel housing.

(4) Disconnect suction and pressure lines from pump to be removed. Cover pump and line openings to prevent entry of dirt and or foreign material.

(5) Remove capscrews securing pump to housing and remove pump.

b. Cleaning and Inspection.

(1) Clean exterior of pump with cleaning solvent.

(2) Inspect drive gear for worn teeth or other damage.

(3) Inspect exterior of pump for cracks or evidence of leaks.

(4) Replace pump if gear or pump is defective.

c. Installation. Install the pump in reverse order of removal. Fill hydraulic tank with oil prescribed on the lubrication order.

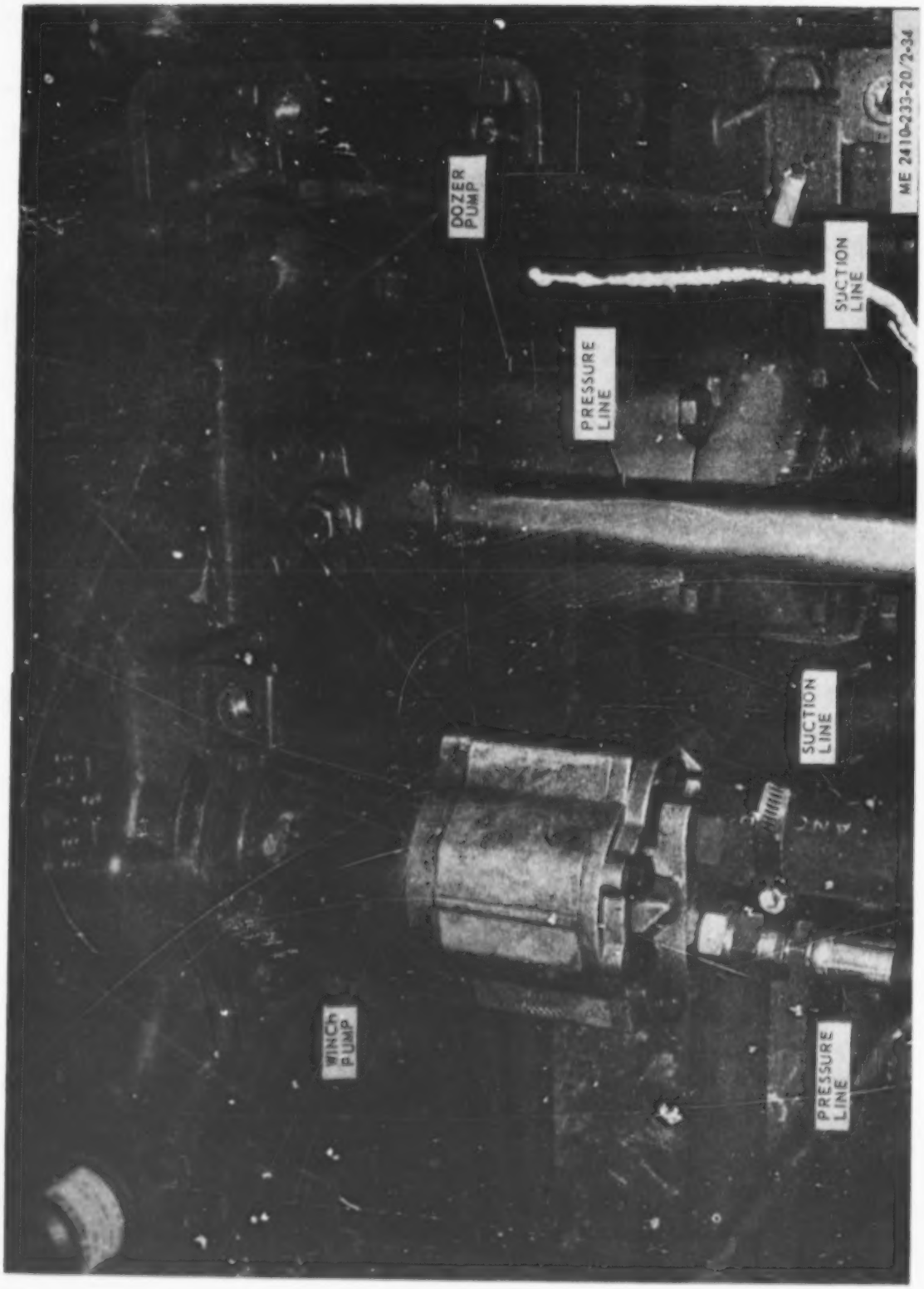


Figure 2-34. Dozer and winch hydraulic pumps.

2-48. Hydraulic Cylinders and Trunnion

WARNING

Relieve pressure before disconnecting hydraulic lines.

a. Removal (Lift Cylinder) (fig. 2-35).

(1) Disconnect hydraulic lines at cylinder to be removed by removing capscrews that secure line flanges to ends of cylinder.

(2) Remove pin that secures push rod to back of moldboard.

(3) Remove capscrews that secure hydraulic tube manifold bracket to cylinder.

(4) Support cylinder with suitable hoist.

(5) Remove capscrews that secure trunnion bearing caps to trunnion and remove bearing caps (fig. 2-36).

(6) Remove cylinder from trunnion.

(7) Remove capscrews that hold yoke pin plate.

(8) Remove yoke pin (hidden) beneath yoke pin plate.

(9) Remove trunnion from tube assembly (fig. 2-36).

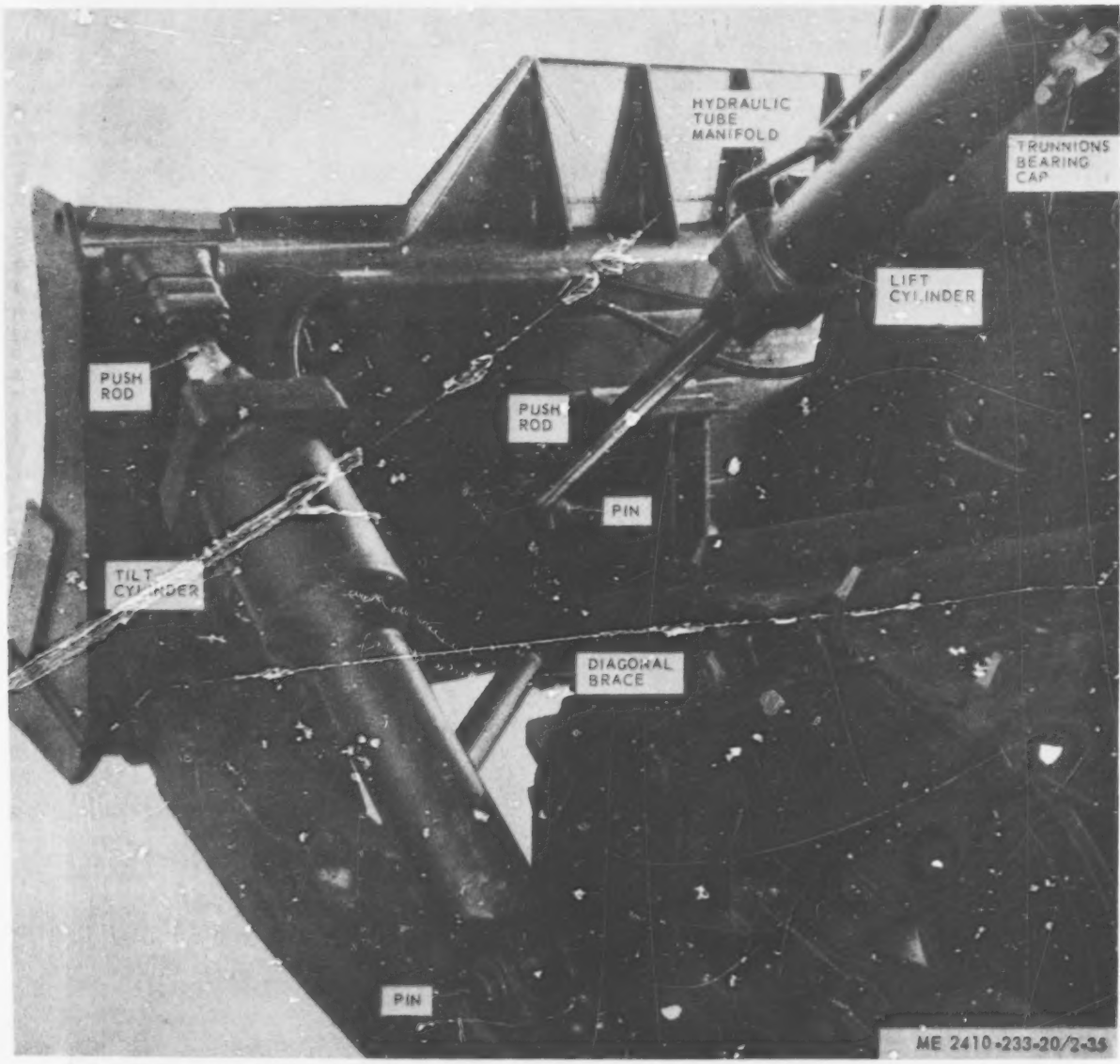


Figure 2-35. Lift and tilt cylinders.

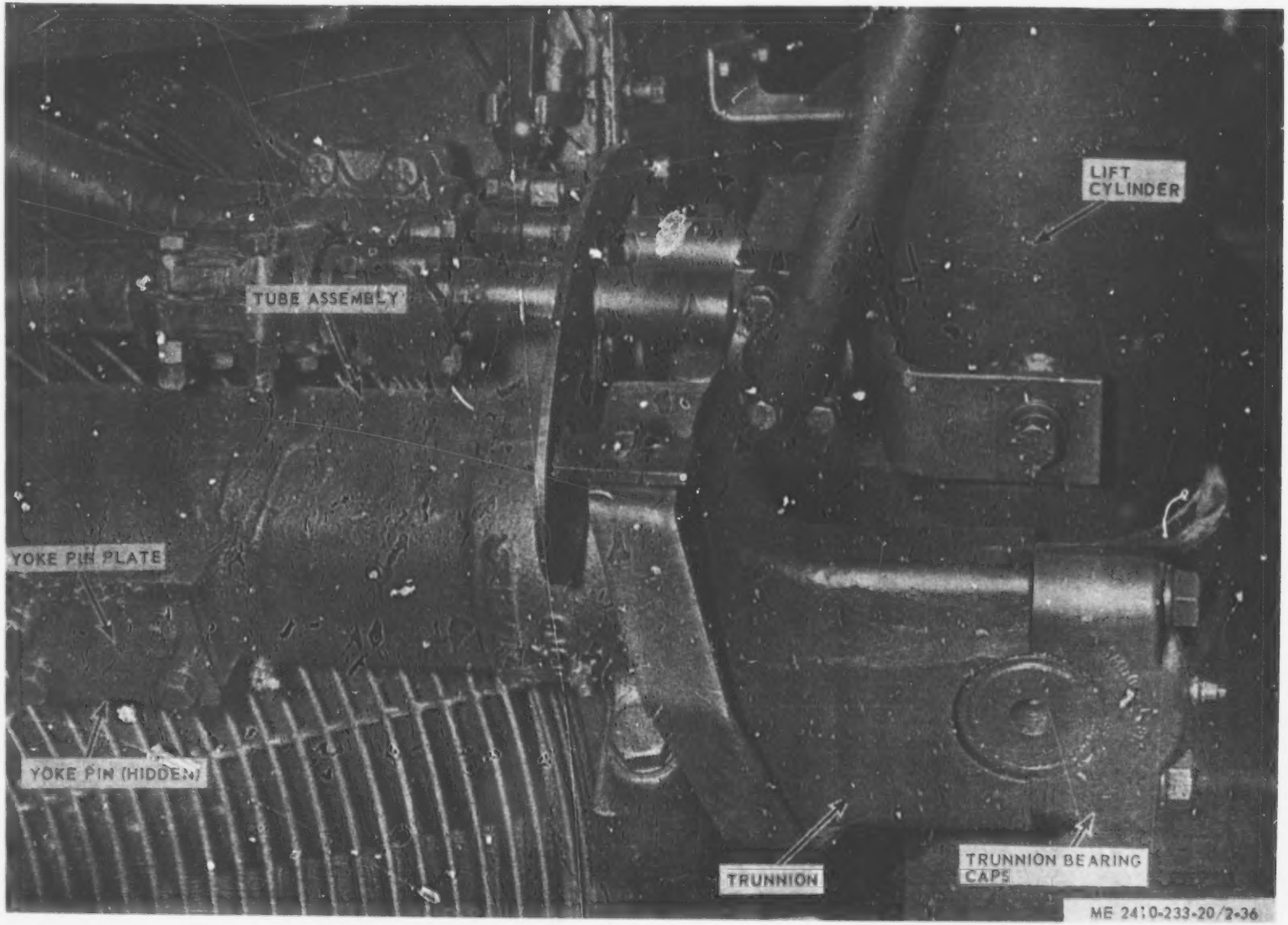


Figure 2-36. Trunnion and tube assembly.

b. Removal (Tilt Cylinder).

(1) Disconnect hydraulic lines at cylinder by removing capscrews that secure line flanges to cylinder:

(2) Support cylinder with a suitable hoist.

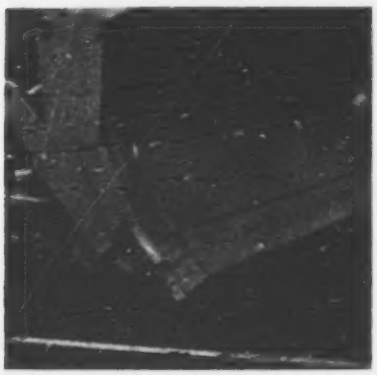
(3) Remove pins that secure cylinder to push beam.

(4) Remove capscrews that secure push rod end to back of moldboard.

(5) Lift cylinder from moldboard being careful to retain shim pack intact.

c. Installation. Installation is reverse of removal procedure. Operate cylinder through several cycles to purge air from the cylinder and lines.

d. Rod Packing Adjustment. To stop oil leaking at the cylinder rod, adjust the packing as described on figure 2-37.

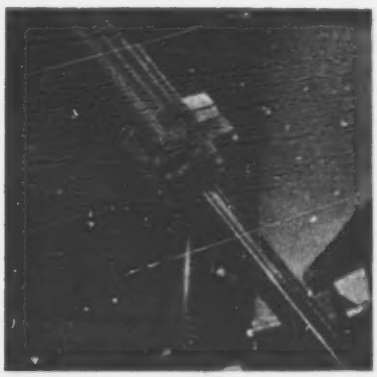


1. Lower blade and stop engine.

2. Move hydraulic controls to relieve pressure.

3. Remove bolts and slide flange away from cylinder head.

4. Cut and remove 1 shim.



5. Slide flange back and install bolts. Start engine and check for leaks.

6. If packing still leaks, report to direct support maintenance.

ME 2410-233-20/2-37

Figure 2-37. Rod packing adjustment.

2-49. Hydraulic Control Levers and Linkages

The hydraulic control levers are secured to the floor plates to the right of the operator. The linkages to connect the levers to the control valves are located beneath the floor plates (fig. 2-38).

a. Removal.

(1) Remove the operator's seat.

(2) Remove the fire extinguisher and its mounting bracket.

(3) Remove the capscrews that secure the swivel bracket to the floor plate.

(4) Remove the capscrews and remove the floor plate.

(5) Remove the nuts, washers, and capscrews that secure the rods to the lever and remove lever and bracket.

(6) Drive roll pin from lever and shaft and drive shaft from lever and bracket.

(7) Disassemble linkages by removing nuts and capscrews.

b. Installation. Installation is reverse procedure of removal.

c. Adjustment. Adjust linkages so that control valves will be in neutral position and so there will be sufficient travel to operate valves without bottoming against the valve stops.

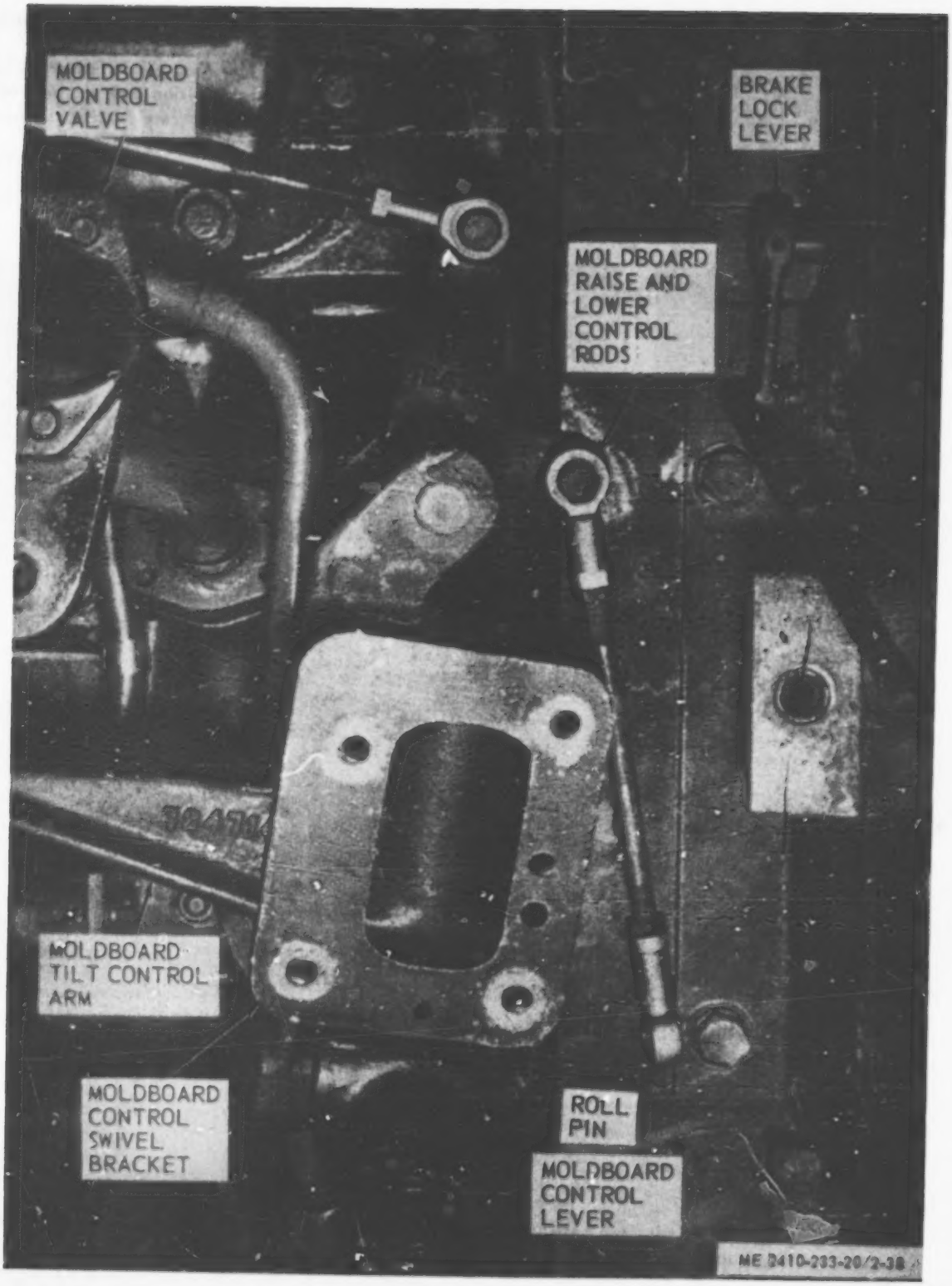


Figure 2-38. Levers and linkage.

Section XII. MAINTENANCE OF DOZER ASSEMBLY

2-50. Tilt Brace and Diagonal Arms

The tilt brace and diagonal arms keep the moldboard in alinement for pushing. They are removed and installed in a similar manner.

a. Removal.

(1) Remove the pin that secures the pins securing the arm or brace to the pushbeam.

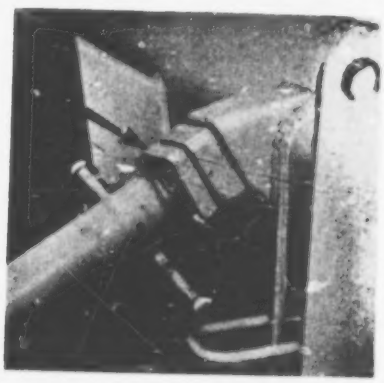
(2) Support the arm or brace with suitable lifting device.

(3) Remove capscrews that secure socket ends to moldboard and remove arm or brace. Keep the shim pack intact for reinstallation.

b. Installation. Installation is reverse of removal procedure. Adjust the ball and socket as described on figure 2-39.

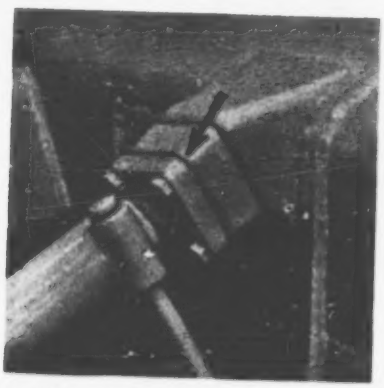
1. Remove cap bolts. Shorten brace and remove shims.

2. Clean grease from ball and socket. Clean shims.



3. Lengthen brace. Install and tighten bolts evenly.

4. Measure clearance between cap and socket with shims.



5. Remove bolts and shorten brace. Install shims equal to measured clearance plus 1 shim.

6. Lengthen brace and install bolts. Tighten bolts to 280 ± 20 lb. ft. (38,75 ± 2,75 mkg). Lubricate ball and socket.

ME 2410-233-20/2-39

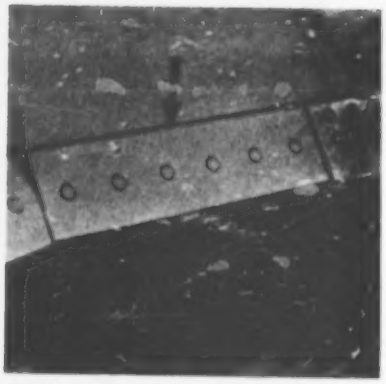
Figure 2-39. Tilt brace and diagonal arm ball and socket adjustment.

2-51. Cutting Edge and End Bits

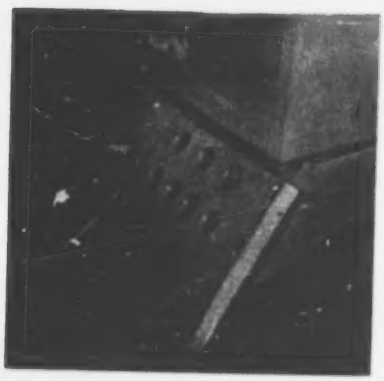
Remove and install cutting edge and end bits as described on figure 2-40.

1. Raise and block blade.

2. Remove cutting edge or end bit. Clean contact surfaces.



3. Use opposite edge if not worn. Install new cutting edge if both edges are worn.



4 Install new end bits.

5. Tighten bolts to 565 ± 85 lb. ft. (78± 12 mkg).*

6. Raise blade and remove blocks.

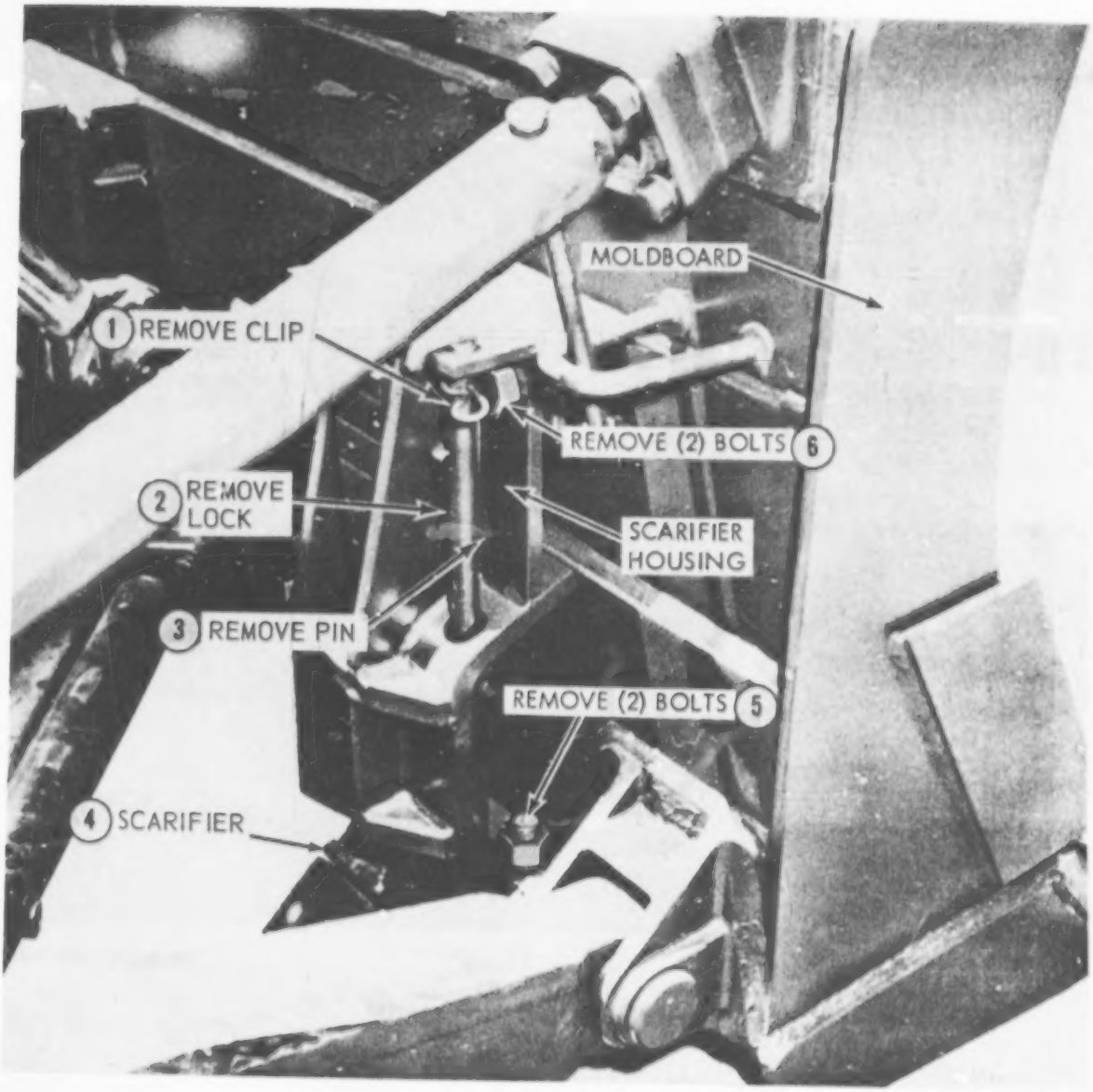
7. Retorque bolts after a few hours of operation.

ME 2410-233-20/2-40

Figure 2-40. Cutting edge and end bit replacement.

2-52. Scarifiers

Remove and install scarifiers and housings as described on figure 2-41.



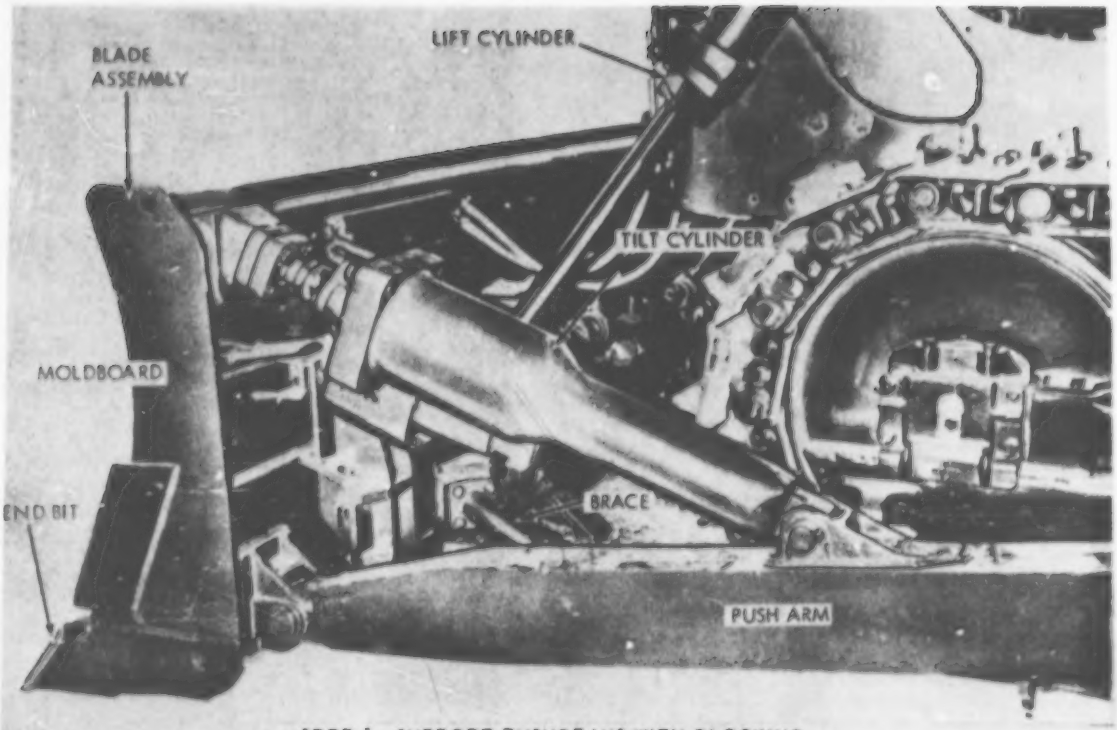
ME 2410-233-20/2-41

Figure 2-41. Scarifier removal.

2-53. Moldboard (Blade) Assembly

a. Removal. Remove the moldboard (blade) assembly as described on figure 2-42. Remove end bits and cutting edge as described in paragraph 2-51.

b. Installation. Installation of moldboard assembly is reverse procedure of removal.



STEP 1. SUPPORT PUSHBEAMS WITH BLOCKING TO PREVENT MOVEMENT.
STEP 2. DISCONNECT LIFT CYLINDER RODS AT MOLDBOARD BY REMOVING PINS.
STEP 3. DISCONNECT HYDRAULIC LINES TO TILT CYLINDER.
STEP 4. SUPPORT TILT CYLINDER WITH HOIST AND REMOVE FROM MOLDBOARD.
STEP 5. DISCONNECT AND REMOVE BRACES.
STEP 6. DISCONNECT PUSHBEAMS AND REMOVE MOLDBOARD.
STEP 7. REMOVE CUTTING EDGE, END BITS, OR SCARIFIERS AS REQUIRED.

ME 2410-233-20/2-42

Figure 2-42. Moldboard (blade) removal.

Section XIII. MAINTENANCE OF WINCH

2-54. Winch Brake Band.

a. Adjustment. Refer to figure 2-43 for adjustment of winch brake band.

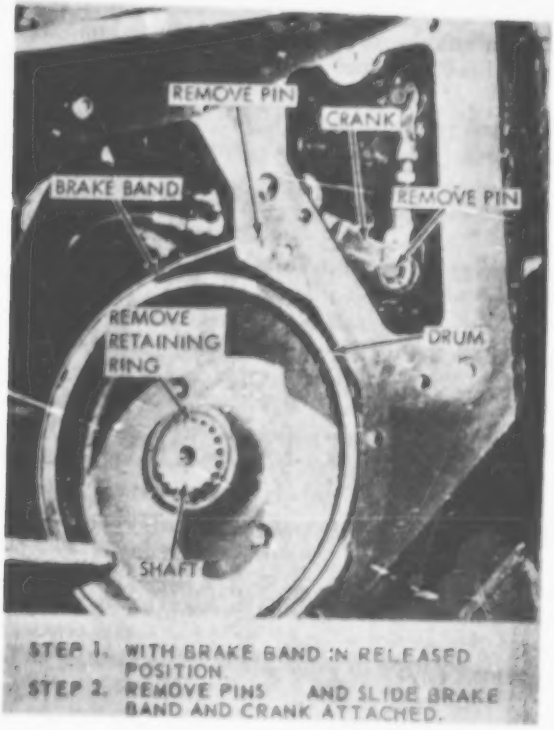
b. Removal. Refer to figure 2-44 and remove winch brake band.

c. Installation. Installation of brake band is reverse procedure of removal. Adjust band before installing covers as described on figure 2-43.

LINK
BRAKE BAND
JAM NUT
BRAKE DRUM
1. REMOVE BOTH COVERS ON LEFT SIDE OF WINCH
2. RELEASE BRAKE BY MOVING THE SELECTOR LEVER TO "BRAKE RELEASE" POSITION
3. LOOSEN THE JAM NUT ON THE ADJUSTING LINK ASSEMBLY
4. TURN THE ADJUSTING LINK IN OR OUT TO SHORTEN OR LENGTHEN AS REQUIRED
5. ALLOW SUFFICIENT CLEARANCE (APPROXIMATELY 1/32 IN.) BETWEEN THE DRUM AND LINING TO PREVENT LINING DRAG
6. TIGHTEN JAM NUT ON ADJUSTING

ME 2410-233-20/2-43

Figure 2-43. Winch brake band adjustment.



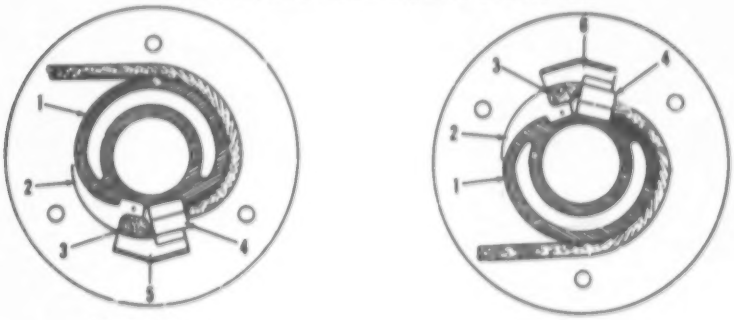
ME 2410-233-20/2-44

Figure 2-44. Winch brake band removal.

2-55. Winch Cable Replacement

Refer to figure 2-45 for procedures for replacement and / or change of direction of cable on the drum.

ATTACHING CABLE TO DRUM -- OVERWIND OR UNDERWIND

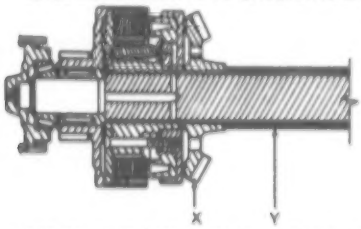


OVERWINDING UNDERWINDING

STEP 1. INSTALL FERRULE (4) AND LOCK IN PLACE WITH FILLER (2) AND FERRULE LOCK (5) FOR OVERWIND, (6) FOR UNDERWIND, USING CAP SCREW (3)

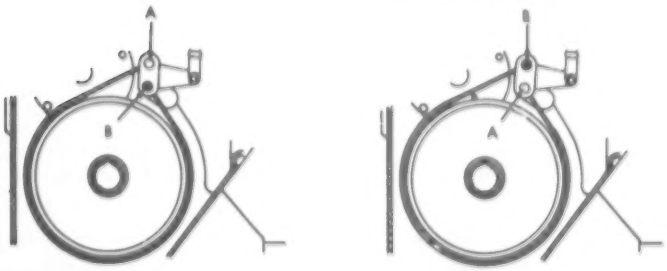
STEP 2. TO CHANGE FROM OVERWIND TO UNDERWIND, REMOVE CABLE GROOVE FILLER (2) FROM OVERWIND POSITION, INSTALL AS SHOWN FOR UNDERWIND AND TACK WELD IN PLACE

BEVEL GEAR OVERWIND TO UNDERWIND CHANGE



FOR UNDERWIND OPERATION REMOVE BEVEL GEAR "X" AND SPACER "Y" AND REPLACE THEM AS SHOWN

BRAKE BAND CHANGE FROM OVERWIND TO UNDERWIND



OVERWINDING UNDERWINDING

PIN "A," 4-5/8" LONG, WITH COTTER HOLE IN CENTER, HOLDS THE MOVEABLE END OF THE BRAKE BAND

PIN "B," 6-3/8" LONG, WITH TAPPED HOLE IN END, IS THE ANCHOR PIN

TO CHANGE FROM OVERWIND TO UNDERWIND, REMOVE PINS "A" AND "B" FROM POSITIONS SHOWN IN ILLUSTRATION MARKED "OVERWINDING" AND INSERT THEM IN POSITIONS SHOWN IN ILLUSTRATION MARKED "UNDERWINDING"

ME 2410-233-20/2-45

Figure 2-45. Winch cable installation.

2-56. Winch Assembly

CAUTION

To prevent damage to winch hydraulic pump, pump must be removed from accessory drive housing if tractor is to be operated without winch.

a. Removal. Clean rear of tractor and winch to prevent entry of dirt into winch during removal.

(1) Refer to figure 2-46 and disconnect the cable ends.

(2) Remove cross sheet (fig. 2-47) from rear of tractor above hydraulic lines.

(3) Disconnect hydraulic lines from fittings on winch. Insert plugs in fittings to prevent entry of foreign matter.

(4) Install capscrews in sides of winch for lift lugs.

(5) Support winch with suitable hoist, winch weights approximately 2600 lbs.

(6) Remove transmission case cover and remove nuts from mounting studs inside case.

(7) Remove nuts and washers from mounting studs outside and below case.

(8) Carefully slide winch from rear of tractor so as not to damage splines on drive shaft. Control cables are removed with winch.

(9) Plug holes in winch case and install transmission case cover.

(10) Put protective cover over drive shaft opening at rear of tractor.

(11) Remove winch-to-transmission packing.

b. Inspection.

(1) Dump oil from transmission into container and check for metal particles. Metal particles in sufficient amounts may indicate teardown of winch is required.

(2) Remove the suction screen from the suction outlet housing and check for metal particles.

(3) Flush interior of winch to remove any residue or metal particles.

(4) Inspect exterior of housing for cracks and evidence of leaking. Cracked housing may be welded by direct support maintenance.

(5) Inspect power take-off and coupling for damaged or worn splines and shafts.

c. Installation.

(1) Reassemble suction screen to outlet and secure cover.

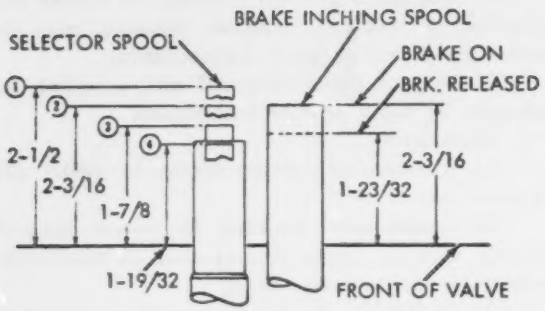
(2) Install new packing in power take-off bearing carrier. Apply liberal coat of heavy-type sealant to preformed packing.

(3) Reinstall winch to rear of tractor and secure with nuts and washers. Install transmission cover.

(4) Attach hydraulic lines and fill winch with proper grade oil

(5) Install control cables and adjust for proper travel (fig. 2-46).

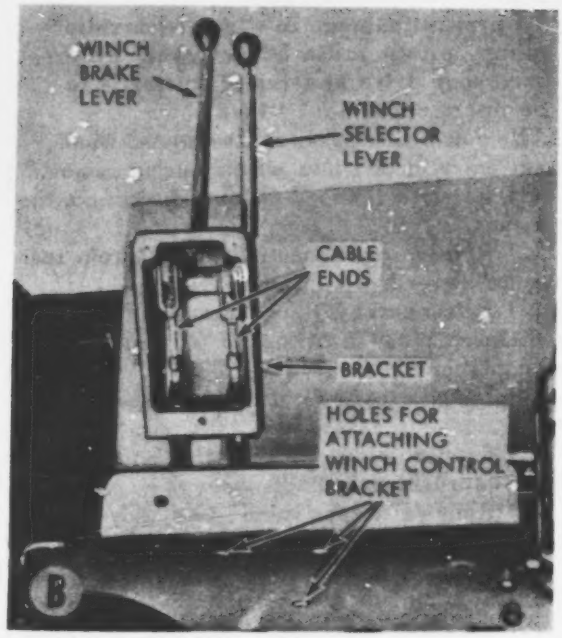
(6) Install hose clamps and cross sheet to rear of tractor.



A

A. CONTROL VALVE SPOOL POSITIONS.

STEP 1. REMOVE TOP COVER OF WINCH VALVE HOUSING BEING CAREFUL NOT TO DAMAGE GASKET.
STEP 2. MEASURE CONTROL VALVE SPOOL AT EACH POSITION OF CONTROL LEVER.
STEP 3. ADJUST PUSH-PULL CABLES AT CONTROL STAND TO OBTAIN MEASUREMENTS SHOWN.



B

B. ADJUSTING AT CONTROL STAND.

STEP 1. REMOVE ARM REST.
STEP 2. REMOVE BOLTS AND REMOVE CONTROL BRACKET.
STEP 3. ADJUST CABLE ENDS SO THAT HAND LEVERS JUST CLEAR BOTTOM OF SLOT IN BRACKET WHEN LEVERS ARE PUSHED AWAY FROM OPERATOR.

ME 2410-233-20/2-46

Figure 2-46. Winch control removal and adjustment.

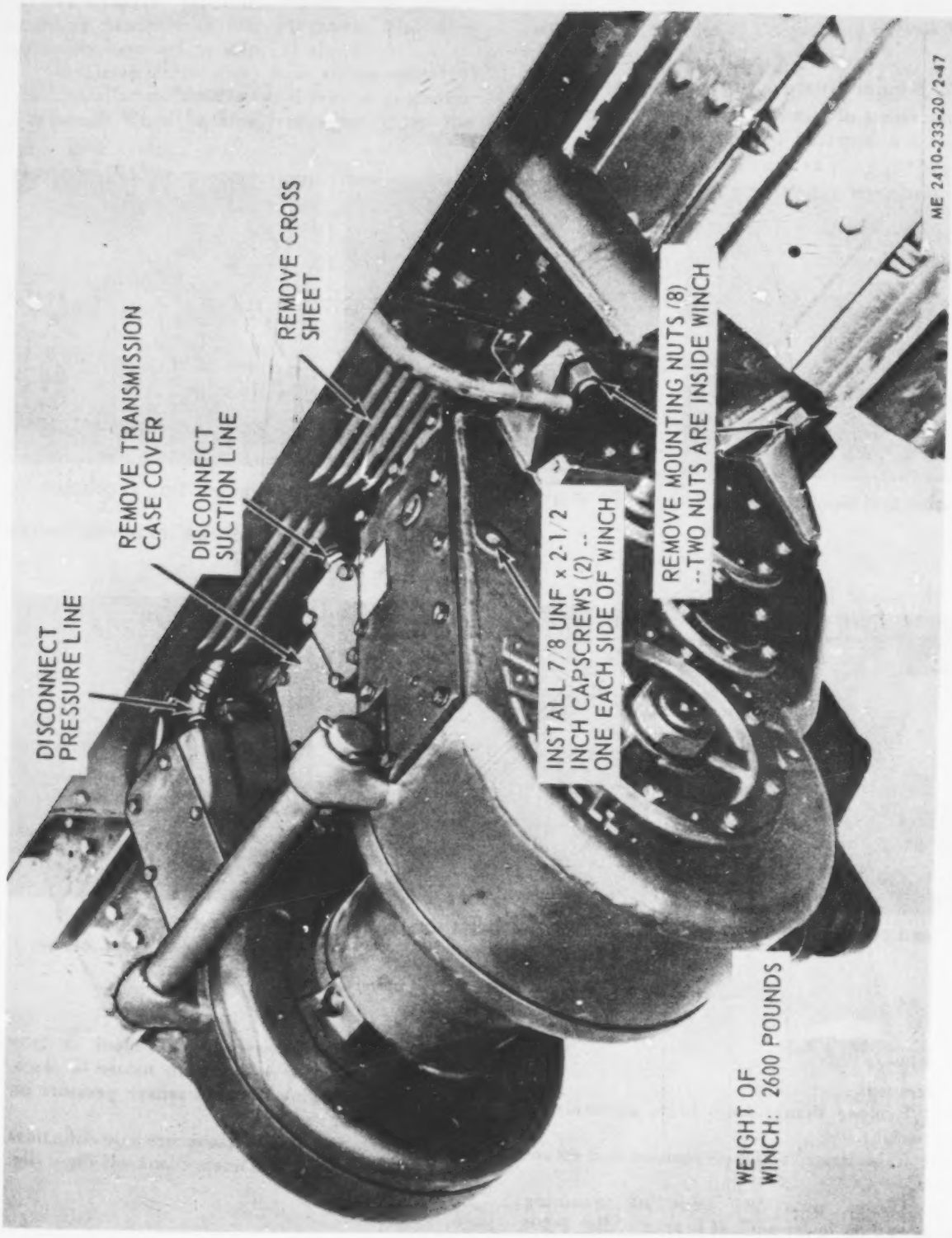

DISCONNECT PRESSURE LINE
REMOVE TRANSMISSION CASE COVER
DISCONNECT SUCTION LINE
REMOVE CROSS SHEET
INSTALL 7/8 UNF x 2-1/2 INCH CAPSCREWS (2) -- ONE EACH SIDE OF WINCH
REMOVE MOUNTING NUTS (8) --TWO NUTS ARE INSIDE WINCH
WEIGHT OF WINCH: 2600 POUNDS
ME 2410-233-20/2-47

Figure 2-47. Winch removal.

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Section XIV. MAINTENANCE OF RIPPER

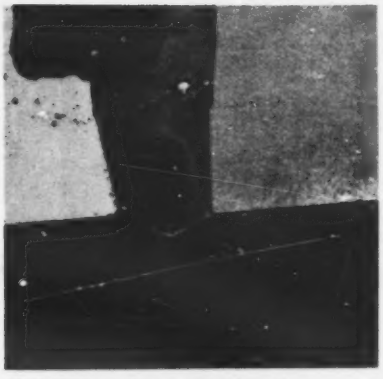
2-57. Ripper Guards, Protectors, and Tips

Replacement of guards, protectors, or tips of the ripper are described on figure 2-48.

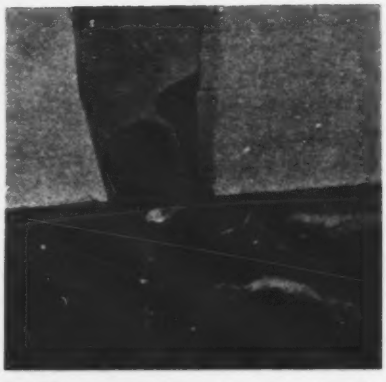
1. Raise and block ripper.

2. Drive pins out.

3. Remove tip, protector or guard.
Tip must be removed before protector.



4 Clean pins and shank.



5. Place new parts on shank and align pin holes.

6. Install pins.

ME 2410-233-20/2-48

Figure 2-48. Ripper guard, protector, and tip replacement.

2-58. Ripper

a. Removal.

(1) Remove shanks from beam assembly to reduce weight.

(2) Raise beam to highest position and secure in place.

(3) Loosen nuts on inside of mounting brackets and on lower ends of brackets (fig. 2-49) but do not remove.

(4) Lower beam assembly and block on dolly or cribbing so ripper will remain secure in place.

(5) With engine stopped, relieve pressure on hydraulic lines.

(6) Remove screws that secure hydraulic lines to manifold and remove lines. Blank off lines (fig. 2-50).

(7) Remove remaining nuts that secure mounting brackets to rear of tractor and nuts previously loosened in step (3) above.

(8) Drive tractor away from ripper assembly.

b. Installation. Installation is reverse procedure of removal. When backing tractor to ripper, use extreme care not to damage threads on studs that secure ripper to tractor. Torque stud nuts to 1500 ft-lb.

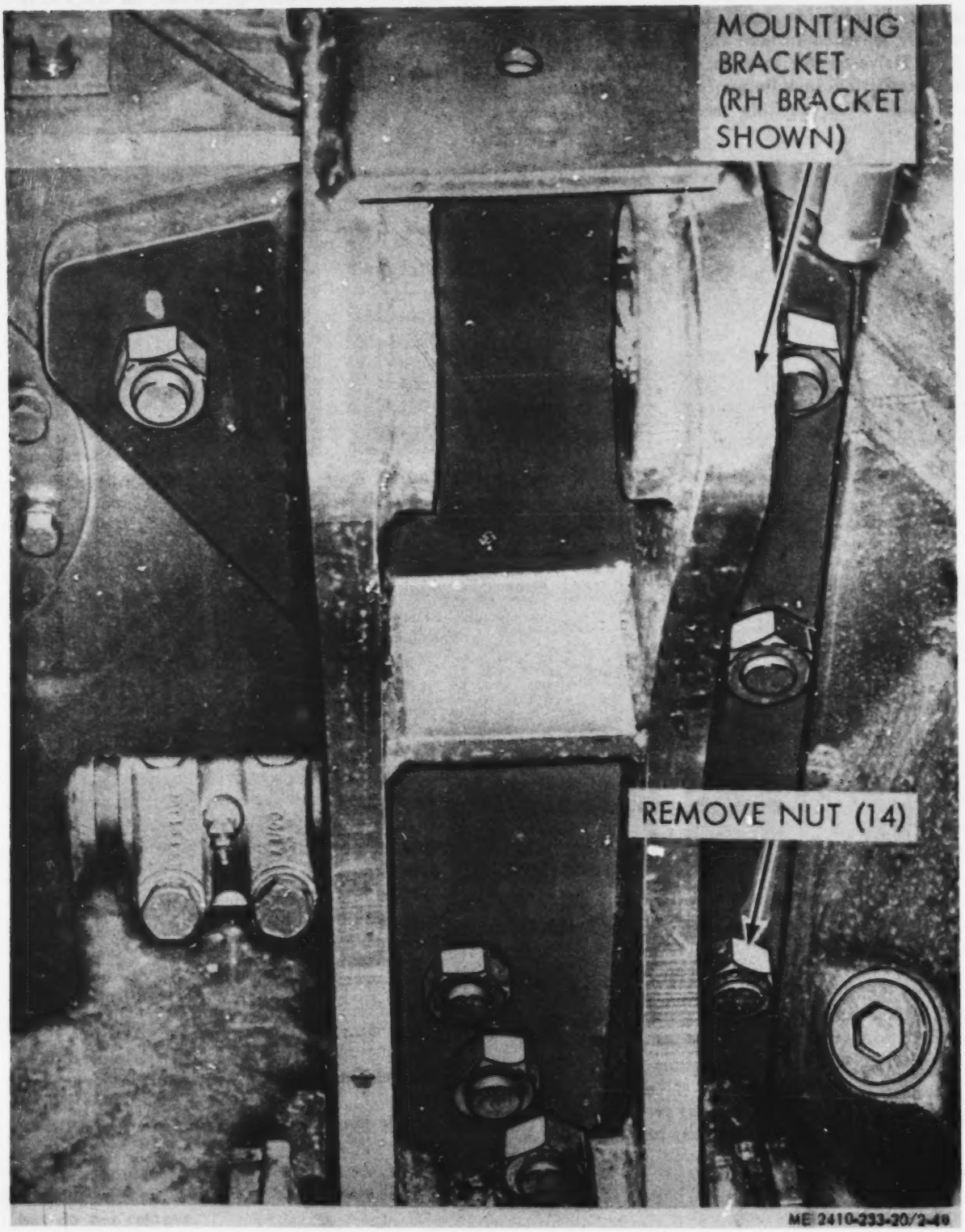


Figure 2-49. Ripper mounting bracket nut removal.

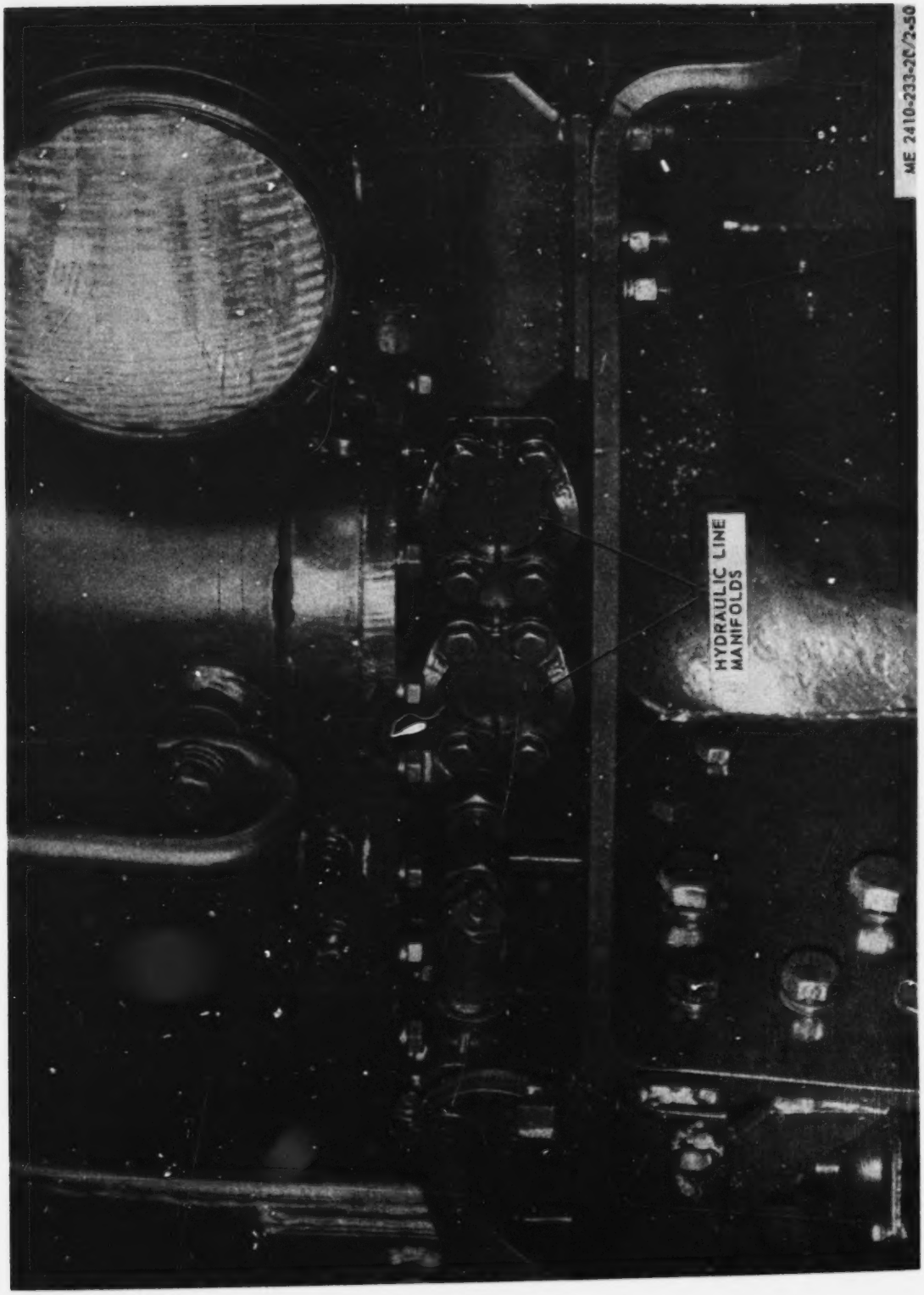


Figure 2-50. Hydraulic manifold (for ripper).

Section XV. MAINTENANCE OF BODY COMPONENTS

2-59. Operator's Seat (fig. 2-51).

a. Removal. Remove the seat by pulling release lever and lifting seat from tractor.

b. Cleaning and Inspection.

(1) Clean cushions with cleaning solvent or warm solution of water and detergent. Wipe dry with clean cloth.

(2) Inspect covers for tears, rips, and general deterioration.

(3) Torn cushions covers should be replaced by fabrication at direct support maintenance.

(4) Replace worn or damaged hardware or frame components.

c. Installation. Installation of components is reverse procedure of removal.

Figure 2-51. Operator's Seat.

2-60. Auxiliary Seat

a. Removal. The auxiliary seat (fig. 2-52) is secured to the tractor fender and floorboard with clamps attached with capscrews, lockwashers, and nuts.

b. Installation. Installation of auxiliary seat is reverse of removal.

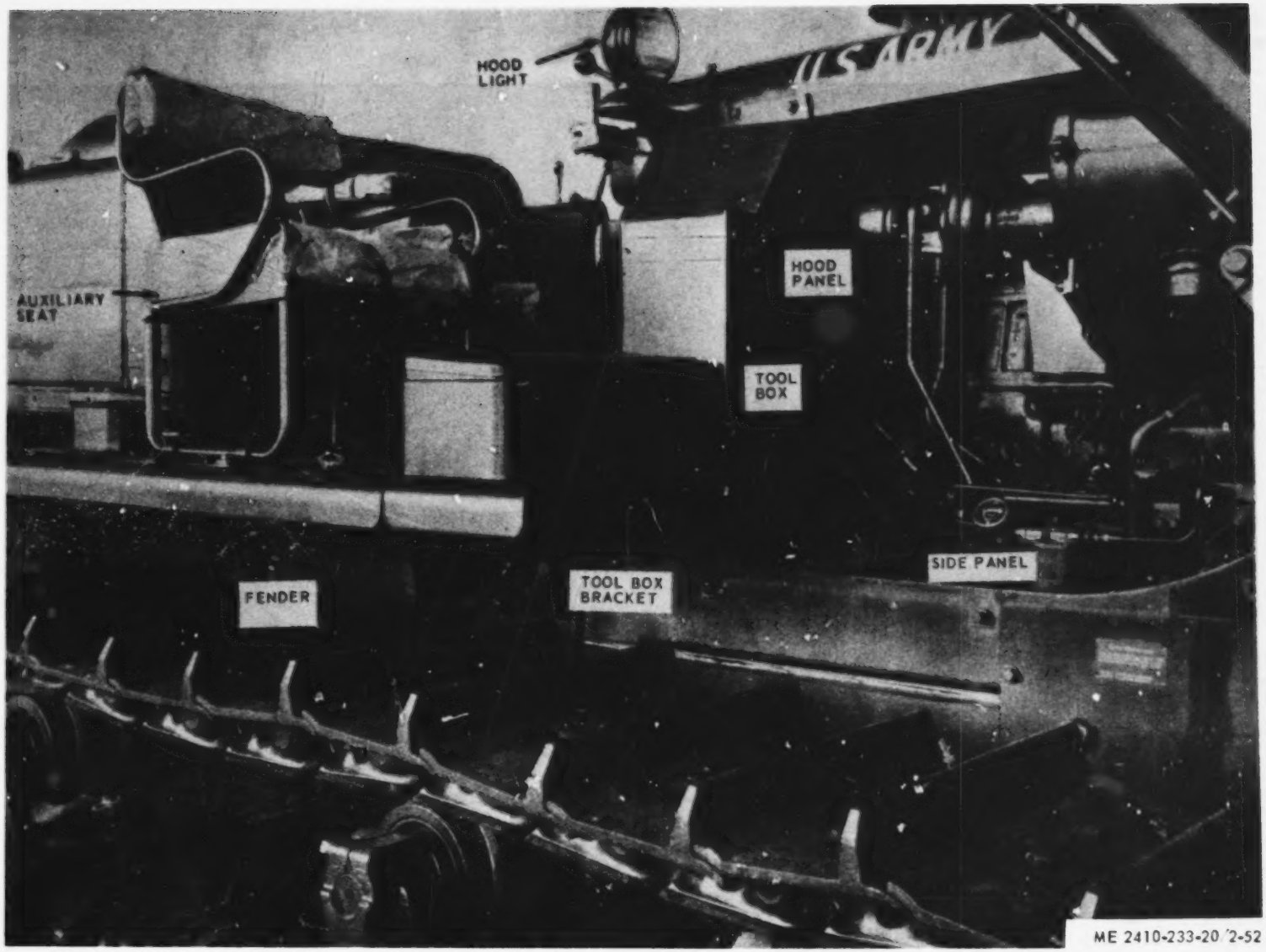


Figure 2-52. Tractor body accessories, right side.

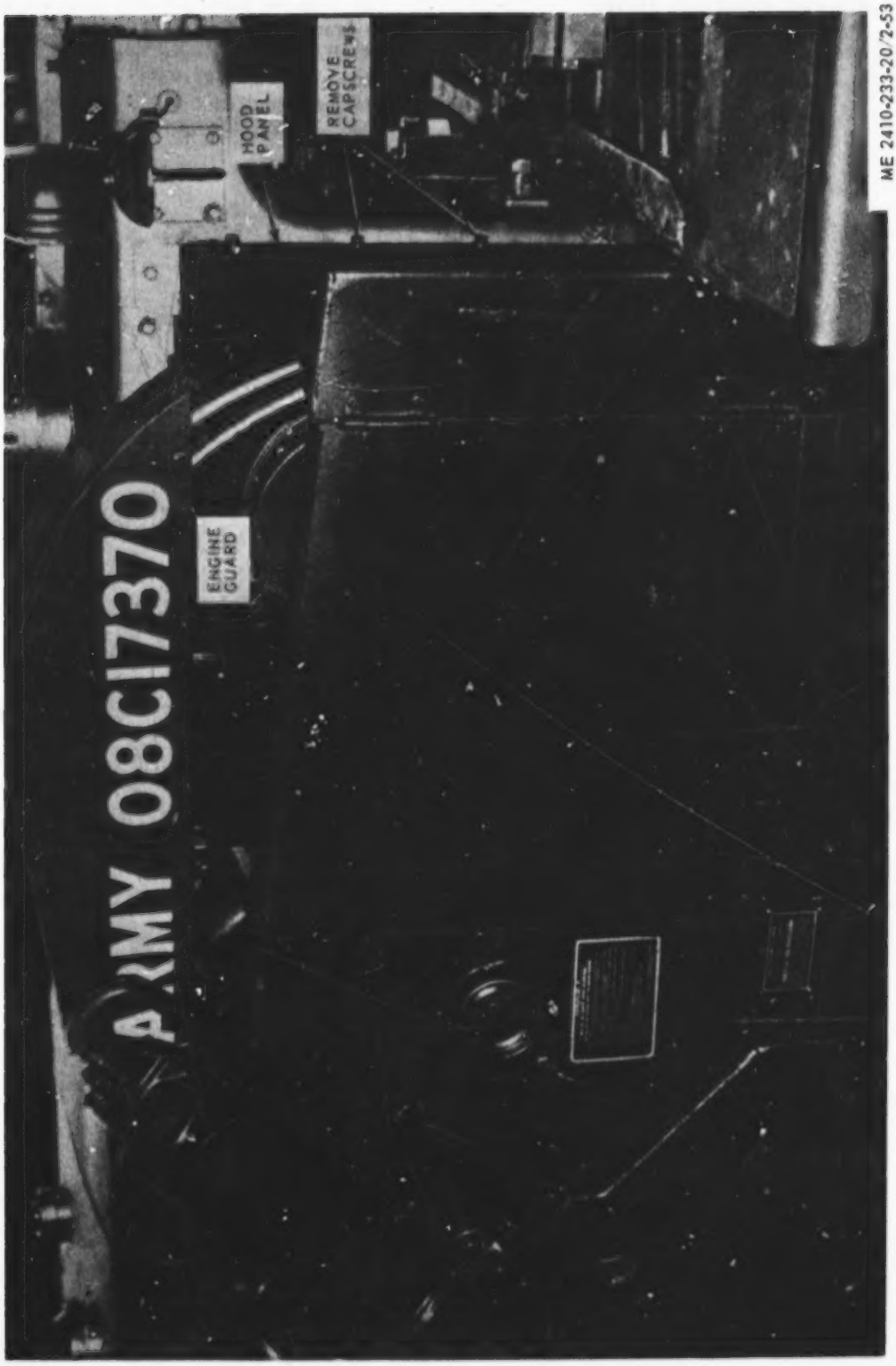
2-61. Side Panels and Crankcase Guards

WARNING

During removal and installation of crankcase and transmission guard make sure that no personnel are under the tractor as these guards are heavy and can cause bodily injury.

a. Removal. Remove the left and right side panels as described on figure 2-53. The crankcase guard is secured to the right frame with capscrews and is hinged to the left frame. The rear guard is secured to both side frames with capscrews and is hinged at the rear to the transmission housing.

b. Installation. Installation of side panels is reverse procedure of removal.



ME 2410-233-20/2-53

Figure 2-53. Engine side panels.

2-62. Fenders and Accessory Boxes

a. Inspection. Inspect fenders, battery box, and tool box for any dents or cracks. Replace damaged battery box or tool box. Fenders that are damaged will be reported to direct support personnel.

b. Removal.

(1) Remove batteries from battery box (left side, fig. 2-54).

(2) Remove hardware that attaches accessory box to fender.

(3) Remove auxiliary seat (right side) and disconnect wire to rear light.

c. Installation. Installation of battery box and tool box is reverse of removal.

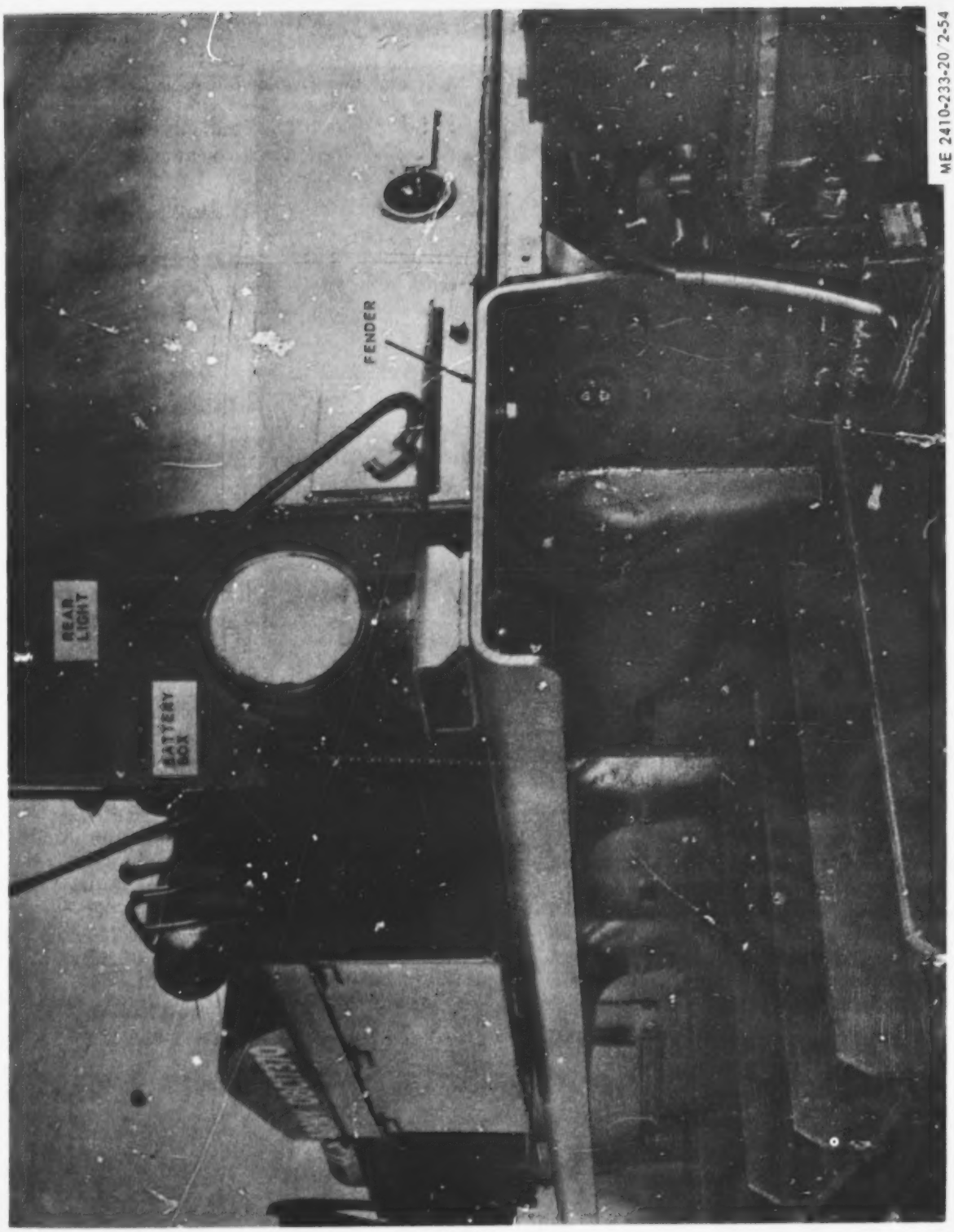


Figure 2-54. Tractor body accessories, left side.

2-63. Floor Boards

a. Removal. Remove bolts (fig. 2-55) and remove floor boards.

b. Installation. Installation is reverse of removal.

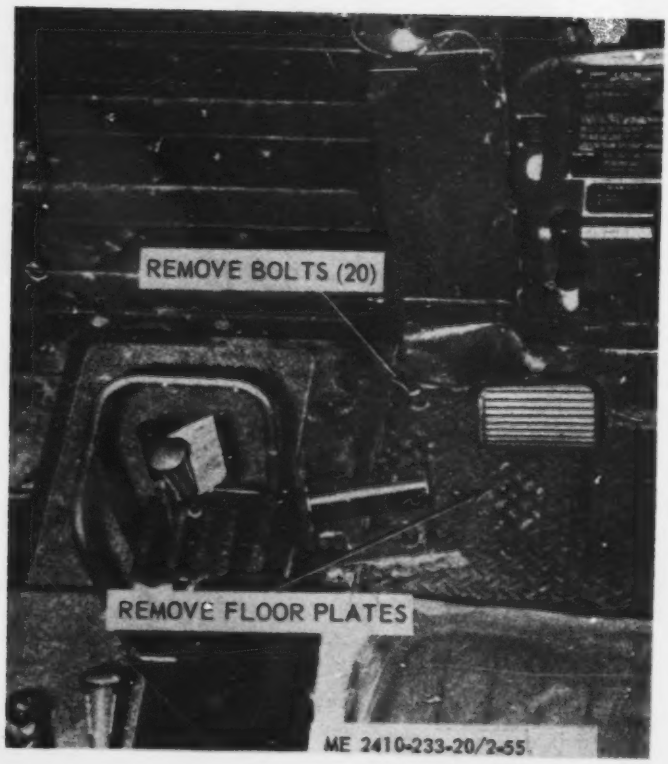


Figure 2-55. Floor board removal.

APPENDIX A

REFERENCES

A-1. Fire Protection

TB 5-4200-200-10	Hand Portable Fire Extinguishers Approved for Army Users

A-2. Lubrication

C9100IL	Fuels, Lubricants, Oils, and Waxes
LO 5-2410-233-12/1, 2 & 3	Tractor, Full Tracked, Caterpillar Model D7F W/Engine D333CT

A-3. Painting

AR 740-1	Color Marking and Preparation of Equipment for Shipment
AR 746-5	Color and Marking of Army Material
TB-740-93-1	Color and Marking of Military Vehicles, Construction Equipment, and Materials Handling Equipment
TM 9-213	Painting Instructions for Field Use

A-4. Cleaning

C6800IL	Chemicals and Chemical Products
SB 725-7930-1	Hard-and Soft-Water Cleaning Compounds

A-5. Maintenance

TB 9-2800-200-50	Ordnance Engines, Run-in and Test Procedures
TB 385-5	Crawler Tractor Safety Manual
TB 750-651	Use of Antifreeze Solutions and Cleaning Compounds in Engine Cooling Systems
TM 5-331A	Earthmoving, Compaction, Grading, and Ditching Equipment
TM 5-2410-233-10	Operator's Manual, D7F Caterpillar Tractor
TM 9-6140-200-15	Lead-Acid Type Batteries
TM 38-750	The Army Maintenance Management System

A-6. Shipment and Storage

TB 740-93-2	Preservation of USAMEC Mechanical Equipment for Shipment for Storage
TM 33-230-1	Preservation and Packing of Military Equipment.
TM 740-90-1	Administrative Storage of Equipment
SB 38-100	Army Preservation, Packing and Marking Materials, Supplies, and Equipment

A-7. Demolition

TM 750-244-3	Destruction of Equipment to Prevent Enemy Use

APPENDIX B

MAINTENANCE ALLOCATION CHART

Section I. INTRODUCTION

B-1. General

a. This section provides a general explanation of all maintenance and repair functions authorized at various maintenance levels.

b. Section II designates overall responsibility for the performance of maintenance functions on the identified end item or component. The implementation of the maintenance functions upon the identified end item or component will be consistent with the assigned maintenance functions.

c. Section III lists the special tools and test equipment required for each maintenance function as referenced from Section II.

d. Section IV contains supplemental instructions or explanatory notes required for a particular maintenance function.

B-2. Explanation of Columns in Section II

a. Group Number, Column (1). The assembly group number is a numerical group assigned to each assembly. The assembly groups are listed on the MAC in disassembly sequence beginning with the first assembly removed in a top down disassembly sequence.

b. Assembly Group, Column (2). This column contains a brief description of the components of each assembly group.

c. Maintenance Functions, Column (3). This column lists the various maintenance functions (A through K). The upper case letter placed in the appropriate column indicates the lowest maintenance level authorized to perform these functions. The active repair time required to perform the maintenance function is included directly below the symbol identifying the level of maintenance. The symbol designations for the various maintenance levels are as follows:

C—Operator or crew
O—Organizational maintenance
F—Direct support maintenance
H—General support maintenance
D—Depot maintenance

The maintenance functions are defined as follows:

A—Inspect. To determine serviceability of an item by comparing its physical, mechanical, and electrical characteristics with established standards.

B—Test. To verify serviceability and to detect electrical or mechanical failure by use of test equipment.

C—Service. To clean, to preserve, to charge, and to add fuel, lubricants, cooling agents, and air.

D—Adjust. To rectify to the extent necessary to bring into proper operating range.

E—Align. To adjust specified variable elements of an item to bring to optimum performance.

F—Calibrate. To determine the corrections to be made in the readings of instruments or test equipment used in precise measurement. Consists of the comparison of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared with the certified standard.

G—Install. To set up for use in an operational environment such as an emplacement, site, or vehicle.

H—Replace. To replace unserviceable items with serviceable like items.

I—Repair. Those maintenance operations necessary to restore an item to serviceable condition through correction of material damage or a specific failure. Repair may be accomplished at each level of maintenance.

J—Overhaul. Normally, the highest degree of maintenance performed by the Army in order to minimize time work is in process consistent with quality and economy of operation. It consists of that maintenance necessary to restore an item to completely serviceable condition as prescribed by maintenance standards in technical publications for each item of equipment. Overhaul normally does not return an item to like new, zero mileage, or zero hour condition.

K—Rebuild. The highest degree of materiel maintenance. It consists of restoring equipment as nearly as possible to new condition in accordance with original manufacturing standards. Rebuild is performed only when required by operational considerations or other paramount factors and then only at the depot maintenance level. Rebuild reduces to zero the

hours or miles the equipment, or component thereof, has been in use.

d. Tools and Equipment, Column (4). This column is provided for referencing by code the special tools and test equipment (Sec. III), required to perform the maintenance functions (Sec. II).

e. Remarks, Column (5). This column is provided for referencing by code the remarks (Sec. IV) pertinent to the maintenance functions.

B-3. Explanation of Columns in Section III.

a. Reference Code. This column consists of a number and a letter separated by a dash entered from column 4 on the MAC. The number references the special tools and test equipment requirements and the letter represents the specific maintenance function the item is to be used with. The letter is representative of colums A through K on the MAC.

b. Maintenance Category. This column shows the lowest level of Maintenance authorized to use the special tools or test equipment.

c. Nomenclature. This column lists the name or identification of the tools or test equipment.

d. Tool Number. This column lists the manufacturer's code and part number, or Federal Stock Number of tools and test equipment.

B-4. Explanation of Columns in Section IV.

a. Reference Code. This column consists of two letters separated by a dash, entered from column 5, Section II. The first letter references the Remark and the second letter references a maintenance function, column 3, A through K, to which the remark applies.

b. Remarks. This column lists information pertinent to the maintenance function being performed, as indicated on the MAC Section II.

Section II. MAINTENANCE ALLOCATION CHART

(1) Group No.	(2) Assembly group	(3) Maintenance functions A Inspect	B Test	C Service	D Adjust	E Align	F Calibrate	G Install	H Replace	I Repair	J Overhaul	K Rebuild	(4) Tools and equipment	(5) Remarks
01	BULLDOZER													
	Cutting edge	C	..	..	..	..	..	..	O.					
		0.1	..	..	..	..	..	..	1.5					
	End bits	C	..	..	..	..	..	..	O					
		0.1	..	..	..	..	..	..	0.5					
	Scarifier housing & teeth	..	..	..	..	..	..	..	O					
									2.0					
	Tilt brace	..	..	..	..	..	..	..	O	O				
									0.8	1.5				
	Diagonal brace	..	..	..	..	..	..	..	O	O				
									1.4	2.5				
	Blade assembly	..	..	..	..	..	..	..	O	F				
									2.0	16				
02	TILT, LIFT CYLINDERS LINES AND FITTINGS													
	Cylinder, assy tilt	..	..	..	..	..	..	..	O	F				
									1.0	3.5				
	Cylinder, assy lift	..	..	..	..	..	..	..	O	F				
									4.0	1.3	..	D	.....	.....A-K
	Lines & Fittings	C	..	..	..	..	..	..	O					
		0.1	..	..	..	..	..	..	2.3					
	Hose, assembly	C	..	..	..	..	..	..	O					
		0.1	..	..	..	..	..	..	7.2					
03	WINCH ASSEMBLY	O	..	O	..	..	..	..	O	F	..	D	.....1-H	
		0.1	..	0.5	..	..	..	..	16	24				
	Control assembly	..	..	..	O	..	..	..	O	F				
					0.5	..	..	..	2	3.1				
04	RIPPER ASSEMBLY	..	..	O	C	..	..	..	O	F				
				0.1	0.2	..	..	..	8	24				
	Cylinder assembly	..	..	..	..	..	..	..	O	F	..	D	.....	.....B-K
									1.4	3.5				

Section II. MAINTENANCE ALLOCATION CHART

(1) Group No.	(2) Assembly group	(3) Maintenance functions A Inspect	B Test	C Service	D Adjust	E Align	F Calibrate	G Install	H Replace	I Repair	J Overhaul	K Rebuild	(4) Tools and equipment	(5) Remarks
04	RIPPER ASSEMBLY (Continued)													
	Lines & fittings	C 0.1	..	..	..	..	..	..	O 2.5					
	Hose assembly	C 0.2	..	..	..	..	..	..	O 0.7					
	Teeth	C 0.2	..	..	..	..	..	..	O 1.0					
05	HEAD & FLOOD LIGHTS	C 0.2	..	..	..	..	..	..	O 1.3	O 1.5				
06	HOOD, SIDE PANEL	C 0.2	..	..	..	..	..	..	O. 1.	O 1.				
	Exhaust pipe	C 0.1	..	..	..	..	..	..	O 0.5					
	Trunnion caps and trunnion	..	..	..	..	..	..	..	O 3.	F 2.5				
07	CRANKCASE GUARDS	O 0.2	..	..	..	..	..	..	O 4.	O 6.				
08	RADIATOR AND GUARD													
	Radiator	C 0.2	..	C 0.1	..	..	..	..	F 4.	F 16.	..	D		
	Cap assembly	C 0.1	..	..	..	..	..	..	O 0.1	O 0.3				
09	SEALED PRESSURE OVERFLOW UNIT	C 0.1	..	O 0.1	..	..	..	..	O 0.1	O 0.3				
	Guard radiator	..	..	..	..	..	..	..	F 1.5	F 1.				
10	FAN AND FAN DRIVE													
	Fan assembly	C 0.1	..	..	C 0.5	..	..	..	F 1.0	..	..	..	.....	.....C-D
	Fan pulley	..	..	..	..	..	..	..	F 1.					
	Belts	C 0.1	..	..	O 0.5	..	..	..	O 0.8					
11	AIR CLEANER & INDICATOR													
	Air cleaner elements	..	..	O 0.2	..	..	..	..	O 0.3					
	Indicator	C 0.1	..	..	..	..	..	..	O 0.3					
12	MUFFLER	O 0.1	..	..	..	..	..	..	O 0.9					
13	FLOOR BOARDS	..	..	..	..	..	..	..	O 2.3					
14	ENGINE ASSEMBLY	C 0.4	F 1.5	C 0.5	..	..	..	..	F 40.	F 40.	H 80.	D 120.		

Section II. MAINTENANCE ALLOCATION CHART

(1) Group No.	(2) Assembly group	(3) Maintenance functions											(4) Tools and equipment	(5) Remarks
		A Inspect	B Test	C Service	D Adjust	E Align	F Calibrate	G Install	H Replace	I Repair	J Overhaul	K Rebuild		
15	GENERATOR & REGULATOR													
	Generator / alternator	..	F	..	..	..	..	..	O	F	H	..	.....	.....D-I
			0.5	..	..	..	..	..	1.2	4.	6.			
	Regulator	..	F	..	..	..	..	..	O					
			0.5	..	..	..	..	..	0.2					
16	STARTER	..	F	..	..	..	..	..	O	F	H	..	.....	.....E-I
			0.2						1.5	8	10			
17	OIL FILTER & COOLER													
	Oil filter, element	..	..	O	..	..	..	..	O					
				0.1	..	..	..	..	0.8					
	Cooler, oil	..	..	F	..	..	..	..	F					
				0.2	..	..	..	..	1.6					
18	WATER PUMP	C	..	..	..	..	..	..	F	F				
		0.1	..	..	..	..	..	..	1.	3.				
	Lines & fittings	O	..	..	..	..	..	..	O					
		0.1	..	..	..	..	..	..	0.8					
19	THERMOSTAT & HOUSING													
	Thermostat	..	O	..	..	..	..	..	O					
			1.0	..	..	..	..	..	0.5					
20	TURBOCHARGER	..	..	..	..	..	..	..	F	H				
									1.3	8.4				
21	EXHAUST MANIFOLD, ROCKER ARM COVER & BREATHER													
	Cover, rocker arm	O	..	..	..	..	..	..	O					
		0.1	..	..	..	..	..	..	0.5					
	Manifold, exhaust	O	..	..	..	..	..	..	F					
		0.1	..	..	..	..	..	..	3.0					
	Breather	..	..	O	..	..	..	..	O					
				0.5	..	..	..	..	0.2	..	..	..	.....	.....F-H
22	ENGINE STARTING AIDS													
	Glow plugs	O	..	..	..	..	..	..	O					
		0.2	..	..	..	..	..	..	2.0					
23	FUEL INJECTOR, LINES & FITTINGS													
	Fuel injector	..	F	..	..	..	..	..	F	H				
			4.0	..	..	..	..	..	3.0	4.0				
	Lines & fittings	O	..	..	..	..	..	..	O					
		0.3	..	..	..	..	..	..	1.5					
24	FUEL FILTER	..	..	O	..	..	..	..	O					
				0.1	..	..	..	..	0.5					
25	FUEL TRANSFER PUMP	..	..	O	..	..	..	..	O					
				0.1	..	..	..	..	0.5					
26	GOVERNOR	..	..	..	O	..	..	..	F	H	..	..	....2-D	.....G-D
					1.0	..	..	..	6.0	24				

Section II. MAINTENANCE ALLOCATION CHART

(1) Group No.	(2) Assembly group	(3) Maintenance functions											(4) Tools and equipment	(5) Remarks
		A Inspect	B Test	C Service	D Adjust	E Align	F Calibrate	G Install	H Replace	I Repair	J Overhaul	K Rebuild		
27	FUEL INJECTION & TRANSFER PUMP													
	Pump Fuel Injection	..	H 2.	..	..	H .8	..	..	F 6.	H 24				
	Pump Fuel Transfer	..	..	..	..	..	..	..	F 1	H 3				
	Hourmeter	O .1	..	..	..	..	..	..	O 0.6					
28	ACCESSORY DRIVE	..	..	..	..	..	..	..	H 7.	H 8.				
	Fuel Strainer	..	..	O .2	..	..	..	..	O 0.5					
29	HYDRAULIC PUMP DRIVE	..	..	..	..	..	..	..	H 1.3	H 6.5				
30	FLYWHEEL HOUSING													
	Flywheel Assembly	..	..	..	..	..	..	..	H 16	H 18	..	..	.....	.....H-I
31	CRANKSHAFT PULLEY	O .1	..	..	..	..	..	..	F 1.2					
	Front engine mount	O 0.1	..	..	..	..	..	..	F 2.4					
32	BARRING GEAR, SHAFT AND TIMING GEAR COVER	..	..	..	..	..	..	.	H 12.0					
33	CYLINDER HEAD ASSEMBLY	..	..	..	..	..	..	..	F 15.5	F 24	..	D	.....	.....I-D
	Rocker arm assembly	..	..	..	O 2.5	..	..	..	F 3.5	F 5.5				
34	OIL PUMP & OIL PAN													
	Oil pan	..	..	..	..	..	..	..	F 8.5	F 2.				
	Oil pump	..	..	..	..	..	..	..	H 10	H 4				
35	PISTONS & CONNECTING RODS	H 4.	..	..	..	..	..	..	H 24	H 2.5	..	..	.....	.....J-H
36	CAMSHAFT	H 2.5	..	..	..	..	..	..	..	H 6				
37	CRANKSHAFT & CYLINDER BLOCK													
	Crankshaft		..	..	..	..	..	..	H 36	D	..	..	.....	.....K-I
	Block cylinder	O 2.5	..	..	..	..	..	..	H 40	H 16				
38	THROTTLE LINKAGE	..	..	..	O 0.2	..	..	..	F 1.7	..	..	..	.....	.....L-H

Section II. MAINTENANCE ALLOCATION CHART

(1) Group No.	(2) Assembly group	(3) Maintenance functions A Inspect	B Test	C Service	D Adjust	E Align	F Calibrate	G Install	H Replace	I Repair	J Overhaul	K Rebuild	(4) Tools and equipment	(5) Remarks
39	CONTROL PANEL GAGES, SWITCHES & WIRING													
	Gages	O	..	..	..	..	..	..	O					
		0.2	..	..	..	..	..	..	1.6					
	Wiring	O	..	..	..	..	..	..	O					
		0.3	..	..	..	..	..	..	4.2					
	Dash assembly	O	..	..	..	..	..	..	F					
		0.3	..	..	..	..	..	..	3.2					
40	TORQUE DIVIDER, RELIEF VALVE & PUMP													
	Torque divider	..	..	..	..	..	..	..	H	H	D			
									16	16				
	Pump	..	..	..	..	..	..	..	O	H				
									2.5	4.7				
	Valve relief	O	H	..	..	..	..	..	H	H				
		0.1	0.5	..	..	..	..	..	1.1	2.7				
41	TRANSMISSION MAIN HYDRAULIC PUMP	O	H	..	..	..	..	..	O	H				
		0.1	1.3	..	..	..	..	..	2.1	4.5				
42	TRANSMISSION LINES, OIL COOLER & FILTER													
	Oil cooler	..	..	O	..	..	..	..	O					
				.5	..	..	..	..	1.5					
	Filter element	..	..	O	..	..	..	..	O					
				0.2	..	..	..	..	0.8					
	Lines; fittings	C	..	..	..	..	..	..	O					
		0.1	..	..	..	..	..	..	1.5					
43	PROPELLER SHAFT	O	..	..	..	..	..	..	F	F				
		1.5	..	..	..	..	..	..	2.5	1.5				
44	TRANSMISSION CONTROLS	..	..	..	F	..	..	..	F	F				
					1.5	..	..	..	3.5	2.5				
45	TRANSMISSION ASSEMBLY	O	F	O	..	..	..	..	H	H	..	D		
		0.3	2.5	0.5	..	..	..	..	19.5	24				
46	SEAT	..	..	C	..	..	..	..	O	O	..	..	.....	.....M-I
				0.5	..	..	..	..	2.5	4.1				
47	FUEL TANK	C	..	C	..	..	..	..	F	F				
		0.1	..	.5	..	..	..	..	3.5	6.5				
48	HYDRAULIC TANK	C	..	C	..	..	..	..	F	F				
		0.1	..	.5	..	..	..	..	4.5	8.				
49	HYDRAULIC CONTROL VALVES LEVERS & LINKAGE													
	Valves	..	..	..	O	..	..	..	F	F				
					0.2	..	..	..	5.3	4.5				
	Levers & Linkage	..	..	..	O	..	..	..	O	F				
					1.2	..	..	..	2.1	2.2				

Section II. MAINTENANCE ALLOCATION CHART

(1) Group No.	(2) Assembly group	(3) Maintenance functions A Inspect	B Test	C Service	D Adjust	E Align	F Calibrate	G Install	H Replace	I Repair	J Overhaul	K Rebuild	(4) Tools and equipment	(5) Remarks
50	BATTERIES	..	O	C	..	..	..	..	O					
			0.1	0.3	..	..	..	..	0.5					
	Cables	C	..	..	..	..	..	..	O					
		0.2	..	..	..	..	..	..	0.5					
51	STEERING BRAKE CONTROLS	O	..	C	O	..	..	..	F					
		0.4	..	0.2	0.5	..	..	..	3.5					
52	STEERING BRAKE & FRAME COVER	O	..	..	..	..	..	..	O					
		0.2	..	..	..	..	..	..	1.					
53	STEERING BRAKE & LININGS	..	..	..	..	..	..	..	H	H				
									16	24				
54	TRACK ASSEMBLY	C	..	..	O	..	..	..	F					
		0.5	..	..	0.1	..	..	..	2					
	Track shoes	..	..	..	..	..	..	..	O					
									24					
55	TRACK FRAME ROLLER GUARD	O	..	..	..	..	..	..	O					
		0.5	..	..	..	..	..	..	8.9					
56	TRACK CARRIER & LOWER ROLLERS	O	..	..	..	..	..	..	F	..	D			
		0.5	..	..	..	..	..	..	16					
57	TRACK IDLER & ADJUSTMENT	O	..	..	O	..	..	..	F	F				
		0.5	..	..	2.	..	..	..	10.	16.				
	Track adjuster cyl	O	..	..	O	..	..	..	F	F	..	..	.....	.....N-I
		0.5	..	..	0.2	..	..	..	8.0	16.				
58	TRACK FRAME	O	..	..	..	..	..	..	H					
		0.2	..	..	..	..	..	..	24					
59	TRACK DRIVE SPROCKET	O	..	..	O	..	..	..	F					
		0.5	..	..	2.0	..	..	..	32.					
60	FINAL DRIVE	..	..	O	..	..	..	..	H	H				
				0.5	..	..	..	..	50	50				
61	STEERING CLUTCHES & VALVES													
	Steering clutch	..	..	..	..	..	..	..	H	H				
									42	42				
	Valves	..	..	..	..	..	..	..	H	H				
									4.	4.				
62	TOOL BOX & FENDERS													
	Tool box	O	..	..	..	..	..	..	O					
		0.1	..	..	..	..	..	..	0.8					
	Fenders	O	..	..	..	..	..	..	F					
		0.1	..	..	..	..	..	..	8					
63	EQUALIZER BAR	F	..	..	..	..	..	..	H	H				
		1.0	..	..	..	..	..	..	8	4.				
64	FINAL DRIVE CASE	O	..	..	..	..	..	..	D					
		1.0	..	..	..	..	..	..	50					

Section II. MAINTENANCE ALLOCATION CHART

(1) Group No.	(2) Assembly group	(3) Maintenance functions											(4) Tools and equipment	(5) Remarks
		A	B	C	D	E	F	G	H	I	J	K		
		Inspect	Test	Service	Adjust	Align	Calibrate	Install	Replace	Repair	Overhaul	Rebuild		
65	DATA & INSTRUCTION PLATES	C 0.1	..	.	..	..	..	..	O 1.5					
66	WIRING HARNESS	O 0.3	..	..	..	..	..	..	F 4.0					

Section III. SPECIAL TOOL AND SPECIAL TEST EQUIPMENT REQUIREMENTS

Reference code	Maintenance Category	Nomenclature	Tool number
1-H	O	WRENCH, winch removal	209059 (30076)
2-D	O	ADAPTER, tachometer drive	2N6741 (11083)

Section IV. REMARKS

Reference Code	Remarks
A-K	Includes chrome plating rods and grinding.
B-K	Includes chrome plating rods and grinding.
C-D	Includes reversing fan blades.
D-I	Includes repair by kit.
E-I	Includes repair by kit.
F-H	Includes removal and cleaning.
G-D	Includes decelerator pedal linkage.
H-I	Includes replacing ring gear.
I-D	Includes rebuild in accordance with TM 5-DCSC 2815-38, date October 1969.
J-H	Includes alignment.
K-I	Includes chrome plating, grinding and aligning.
L-H	Includes adjusting linkage.
M-I	Includes operator's and buddy seat.
N-I	Includes chrome plating and grinding piston rod.

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By Order of the Secretary of the Army:

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The Adjutant General

Distribution:
To be distributed in accordance with DA Form 12-25B (qty rqr block no. 478), Organizational maintenance requirements for Tractors, Tracked, Medium.

☆U.S. GOVERNMENT PRINTING OFFICE : 1990 0 - 261-872 (21259)

TM 5-2410-233-20 TRACTOR, FULL-TRACKED, LOW SPEED – 1973

PIN: 005388-000